1956 Series

P★S

Issue 43

THE PREVENTIVE MAINTENANCE MONTHLY

SPECIAL ARTICLE
100-AMP CHARGING SYSTEM
SEE PAGE 2

MESSAGE URGENT MESSAGE URGENT MESSAGE URGENT MESSAGE URGEN

CALLING ALL COMMANDERS—

YOUR HELP NEEDED TO ACCOMPLISH MISSION: BETTER PREVENTIVE MAINTENANCE OF ARMY EQUIPMENT.

HERE'S HOW YOU CAN DO IT—

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IN THIS ISSUE

FEATURE ARTICLES

100-Ampere Charging System	2
Your Truck's Cooling System (Cartoon Section)	21
That New Meter's Ready	29
Anti-Freeze—In or Out?	31
M48 Tank Tarpaulin	33
Nike Roundup	34
90-MM AAA Gun Check	38
Save Those Rod Bearings	42
Winch Cable Tips	44

DEPARTMENTS

Connie Rodd	29
Half-Mast	31
Armament	37
Engineers	42
Publications	46
Contributions	47
Connie Briefs	49

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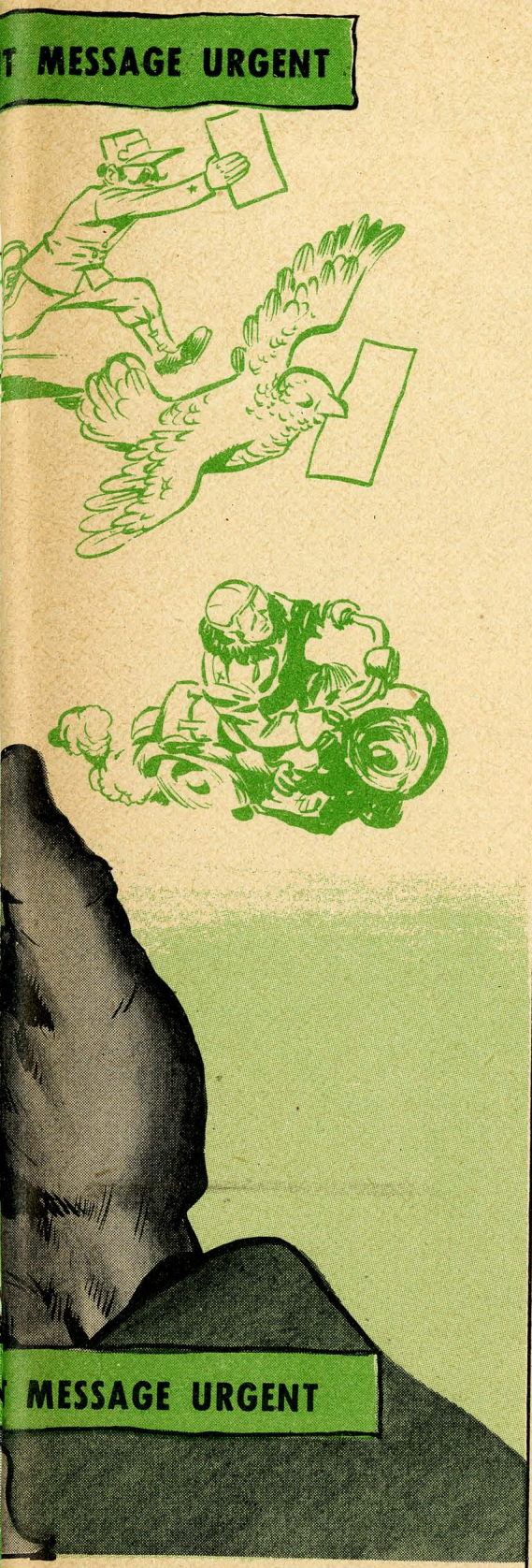

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Here's How On Your New—

100-AMPERE AC

Everybody who has to keep a constant radio contact from a jeep or command truck or armored carrier has been screaming for a larger capacity charging system to keep their batteries up. So it's on the way.

The new 100-ampere rectified AC charging system is being installed as original equipment in the M59 armored personnel carriers, and will be installed in kit form on Commander's jeeps, command trucks and other vehicles which are required to keep constant radio watches.

This system is different from any battery charging system now installed on military vehicles. Instead of a bigger DC generator, it uses an alternator which puts out alternating current. They chose the alternator because it offers several advantages over the direct current generator.

In the first place, an alternator can be built which has a 100-ampere capacity and is only slightly larger than the 25-ampere generator it replaces. Also, the alternator has better output at low RPM's, so it can keep your batteries up and supply your radios when the engine is idling or running slowly. This is just what you need when you are standing ready waiting for orders. Another thing, since the alternator has

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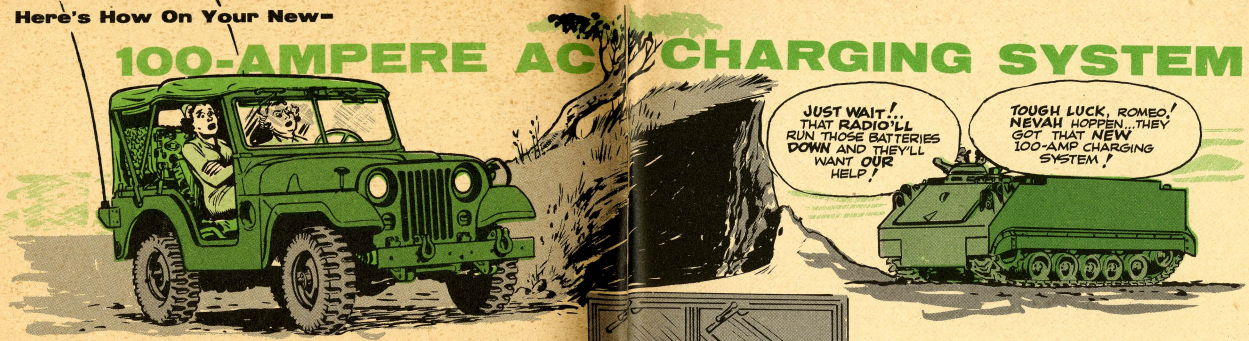
100-AMPERE AC CHARGING SYSTEM



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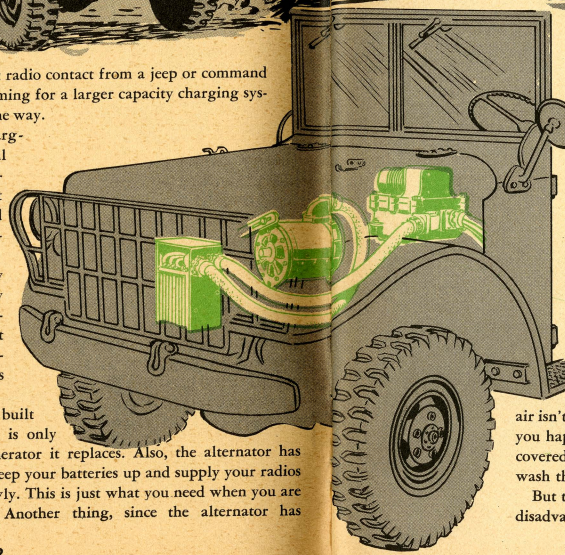
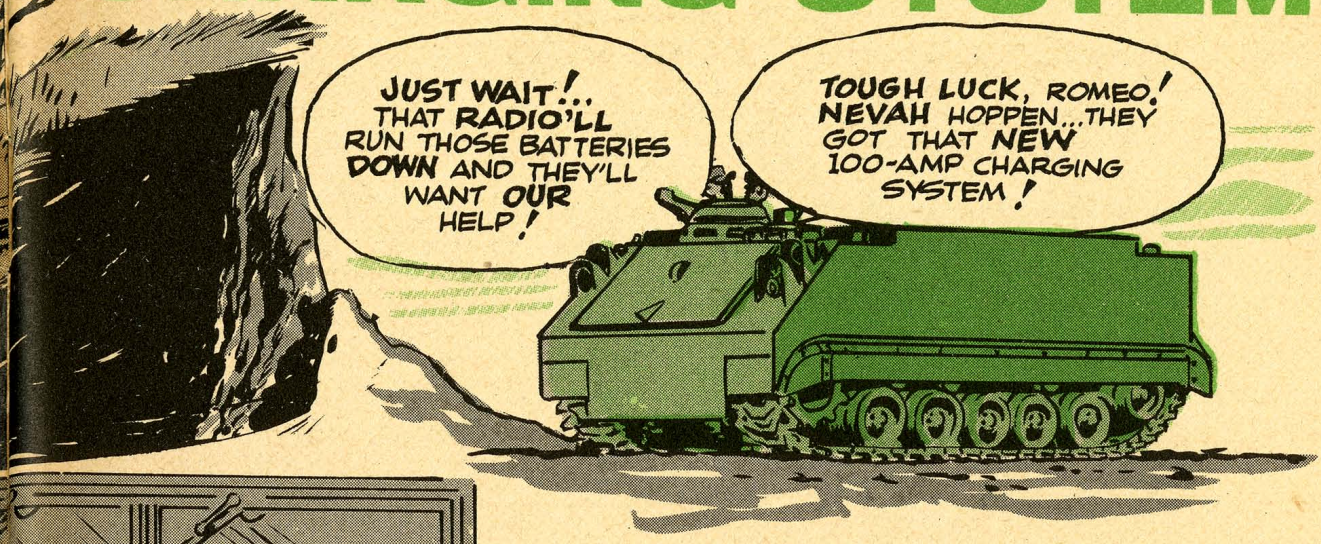


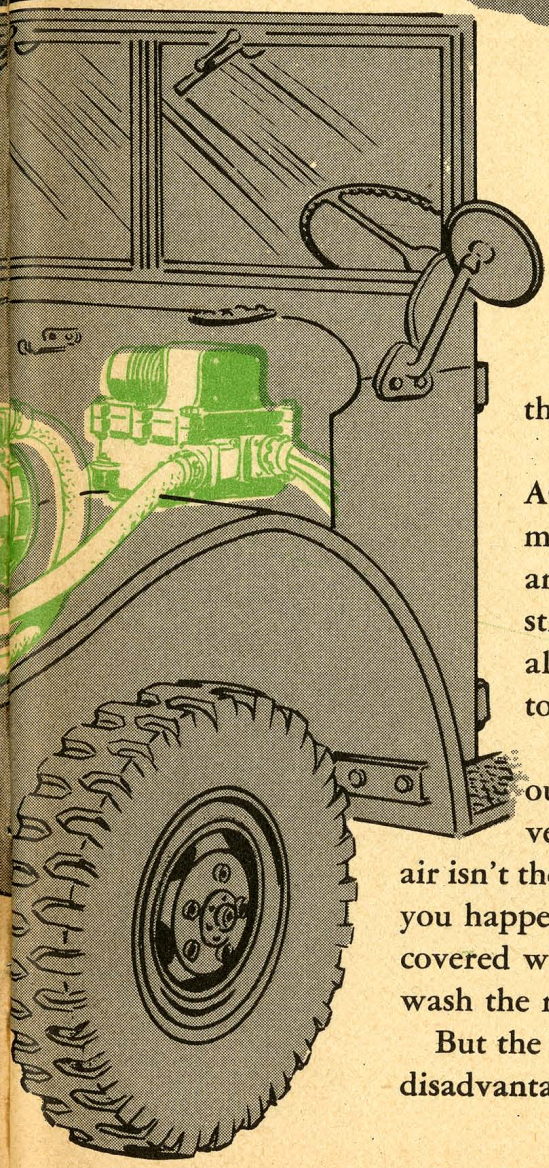
O'course, you never get something for nothing, so the AC system does have a couple of disadvantages. The main one is that you can't charge a storage battery with an alternating current. So you have to have a rectifier to straighten out the back-and-forth currents from the alternator output and get them all headed the same way to your battery.

This rectifier has to be cooled, so it is installed out in front of the radiator on the ¼- and ¾-ton vehicles where the air stream can cool it. Unfortunately, air isn't the only thing that strikes the rectifier—so does any mud you happen to run through. If you run the rectifier when it is covered with mud or dirt, it can get too hot and burn out, so wash the rectifier when you wash the vehicle.

But the many advantages of the system far outweigh the few disadvantages. So, let's look at what you've got. First of

CHARGING SYSTEM





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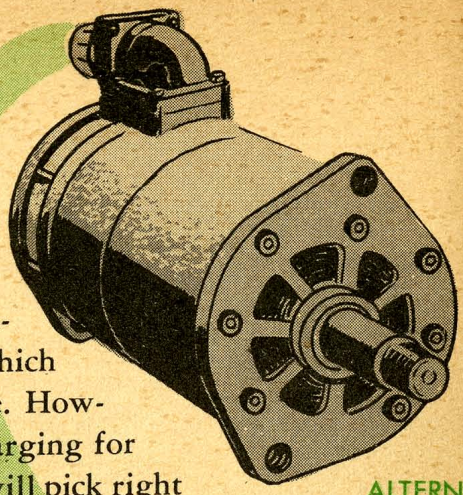
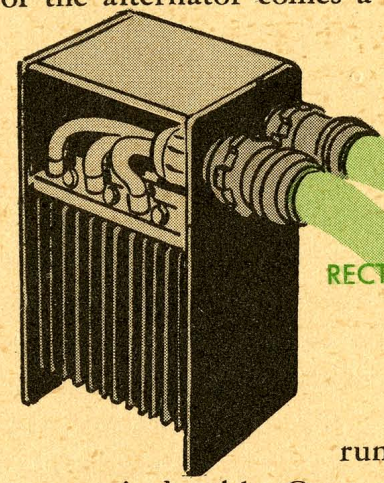
all there is the alternator. This looks much like the generators you are used to. It is belt-driven from the cooling fan pulley of the M59 and from the crankshaft pulley of the other vehicles. You may notice that, unlike the completely sealed 24-volt waterproof generators, the alternator has a fan and has air holes which permit cooling air to pass through the machine. However, it still can go under water. It may stop charging for the time you actually have it under water, but it will pick right up again when you come out.



ALTERNATOR

Out of the alternator comes a shielded harness with plug-in connectors screwed down just like the direct current generator. This harness runs to the rectifier. The rectifier is mounted ahead of the radiator and in the cooling air stream, both in the M59 and in the wheeled vehicle kits.



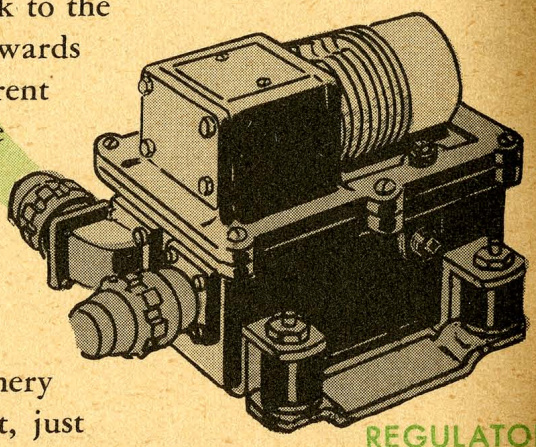
RECTIFIER

Another waterproof and shielded harness comes from the rectifier and runs to the voltage regulator. The voltage regulator is a sealed box with the carbon pile in a casting on its lid. From the regulator a third harness runs to the battery and the loads on the vehicle.

This system is durable. Generally speaking, it won't give you any trouble unless you give it a hard time first. But there is one thing it will **not** stand hitched for—if you put either your batteries or a slave cable into this system backwards—if you reverse the polarity of the battery your rectifier and regulator are **gone**!

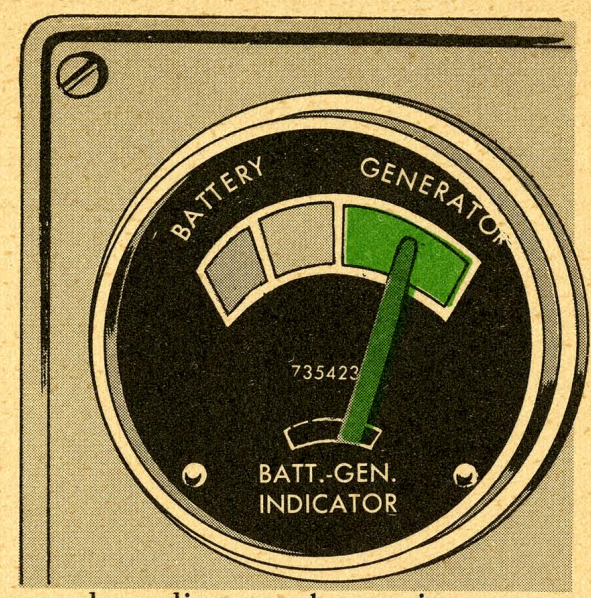
That's **gone** because there is no reverse current cutout in this system. The rectifier serves to prevent battery current running back to the alternator. So if you hook the battery up backwards there is no protection, and full battery current goes sizzling through the alternator and the rectifier. This skittles the rectifier right off and causes a short circuit across the battery terminals through the load relay contacts.

But outside of goofing it up by outside error, this system is pretty rugged as long as you keep the rectifier clean. However, no machinery runs forever, so here's how you check it out, just in case it does lie down on you.



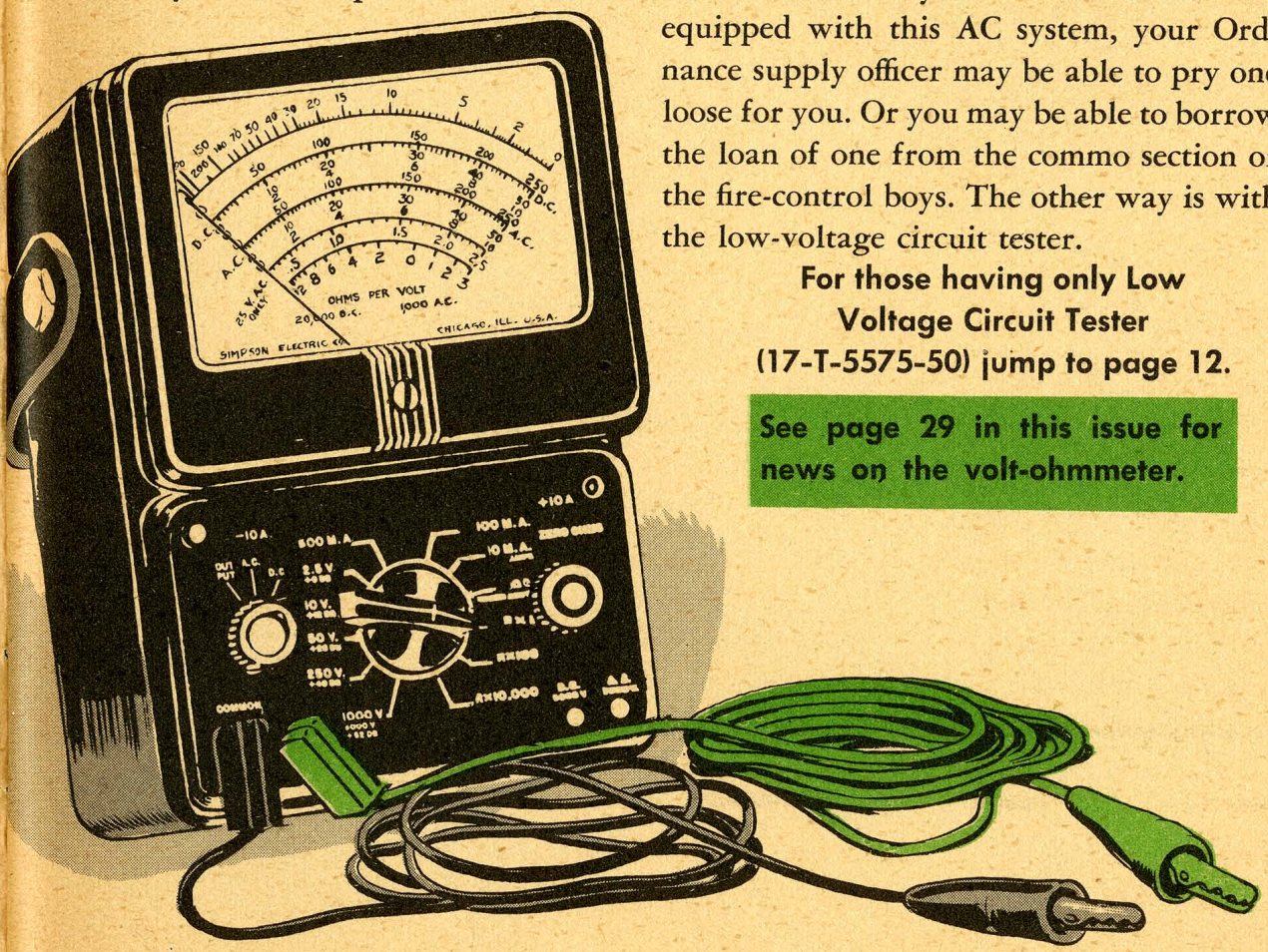
REGULATOR

The second-echelon maintenance on this system is just the same as on the direct current system, with one exception. In other words you only test to find out which of the three units, alternator, rectifier or voltage regulator is bad, or which harness is faulty, and replace the unit. You are authorized to set the output voltage on the voltage regulator. More about this later.



So assume that you have a buggy with this system installed and you think it's not working. Either you are having trouble starting or your battery indicator does not go over into the green when you run your engine.

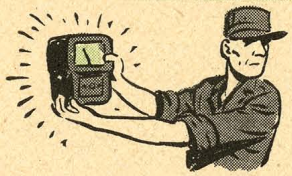
There are two ways you can check this system, depending on what equipment you have at hand or can get. The simplest—and far and away the best method—calls for an AC-DC volt-ohmmeter which is carried under Federal Stock No. 17-V-808. This meter recently became a part of the second-echelon tool set. If you have lots of vehicles equipped with this AC system, your Ordnance supply officer may be able to pry one loose for you. Or you may be able to borrow the loan of one from the commo section or the fire-control boys. The other way is with the low-voltage circuit tester.



For those having only Low Voltage Circuit Tester (17-T-5575-50) jump to page 12.

See page 29 in this issue for news on the volt-ohmmeter.

CHECKS WITH VOLT-OHMMETER



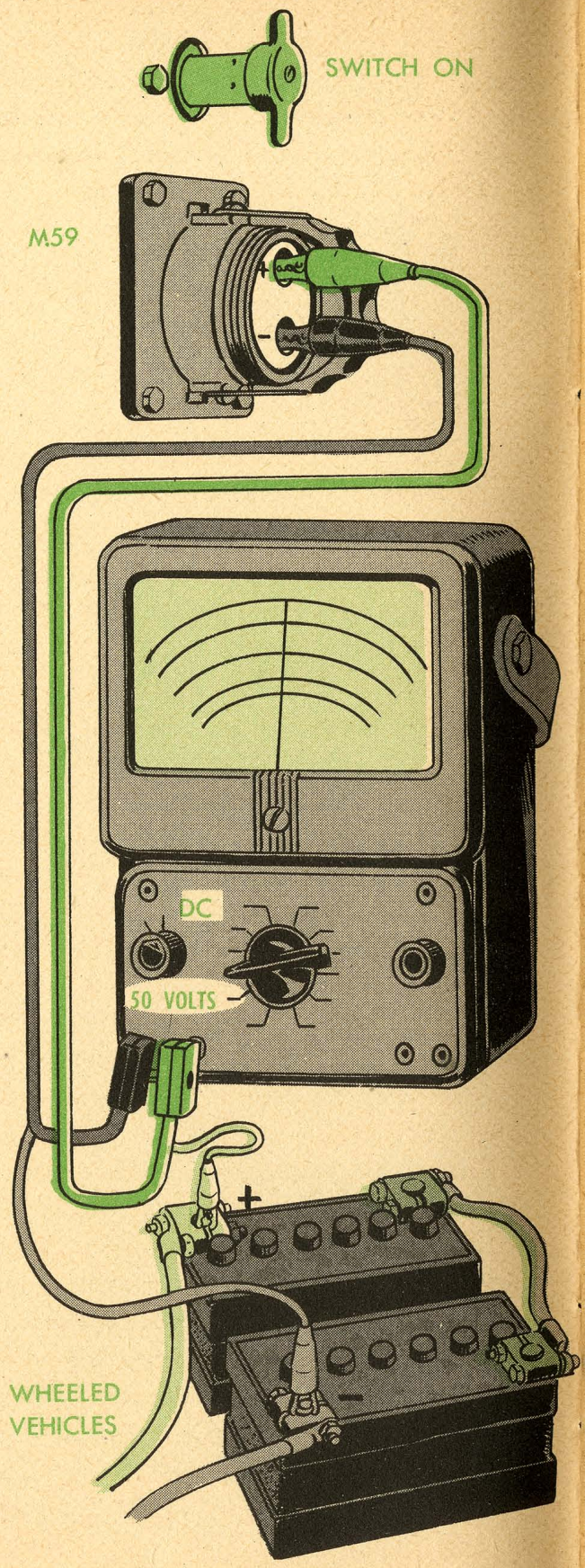
Now, assuming you have such a volt-ohmmeter here's how you use it to check the system out. (Later, we'll get down to how you do it with the low-voltage circuit tester.)

You start by making a battery check. With the meter set for 50 volts, DC, you connect the leads to the slave receptacle of your M59, or from the starter post to ground on your wheeled vehicles. (If working alone, M37 and M42 men can make this check faster by hooking up to the batteries directly, which means they can have the meter right beside them in the cab.)

First of all you read off the battery voltage with no load. (Remember to turn on the master switch in the M59's.) This will be close to 24 volts, no less than 22. Now crank the engine with the starter, with the ignition switch **off** for not over 30 seconds. Watch the meter. The voltage should not drop below 18 volts. If it does, replace or recharge the batteries and go on from there.

Next, you turn the ignition on and start the engine. The voltage will either come back to your first reading, battery voltage, or it will rise to a higher level. If it comes up to 27.5 volts, your system is OK. If the voltage comes up above battery voltage but is greater than 28 volts or less than 27.5 volts, the system is working, but the voltage needs adjusting.

In order to properly adjust the regulator, run the system for 15 to 20 minutes with the headlights on to provide a load. You



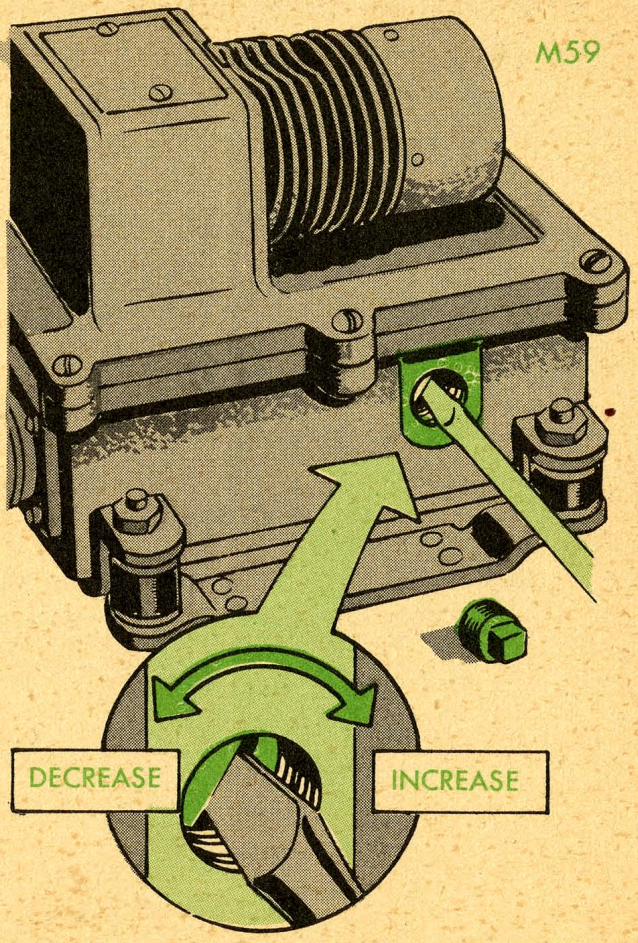
make this regulator adjustment by way of the plug in the voltage regulator box. On the M59's you take out the plug on the side of the control box and look in. You will see a slotted shaft, into which you fit a screw driver. Turning this shaft, which controls the voltage adjusting rheostat, **clockwise** will increase the voltage. Turning it **counterclockwise** will **decrease** the voltage. On the M59's, adjust voltage with the master switch **open.**

On the M37's and some other vehicles equipped with the 100-ampere AC-DC system, the regulator box also has a plug in the cover, removable with a wrench. Looking down this hole will reveal a black knurled disk which is on the shaft of the rheostat. Use a small screwdriver to turn the disk.

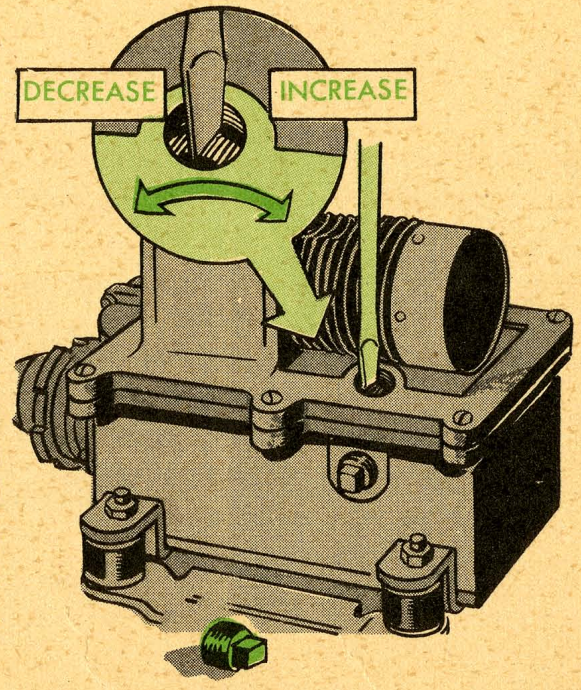
As installed on the M37, you would turn the top of this disk to the **center** of the vehicle to **increase** voltage, **outward** to **decrease** it. If you find that by this adjustment you can set the voltage at 27.5 your troubles are over, batten things down and take off.

But if the voltage shown on your meter does **not** climb above battery voltage when the engine is running, or drops out when you open the master switch, it means you have some sort of trouble in your system, and you've got to hunt it out.

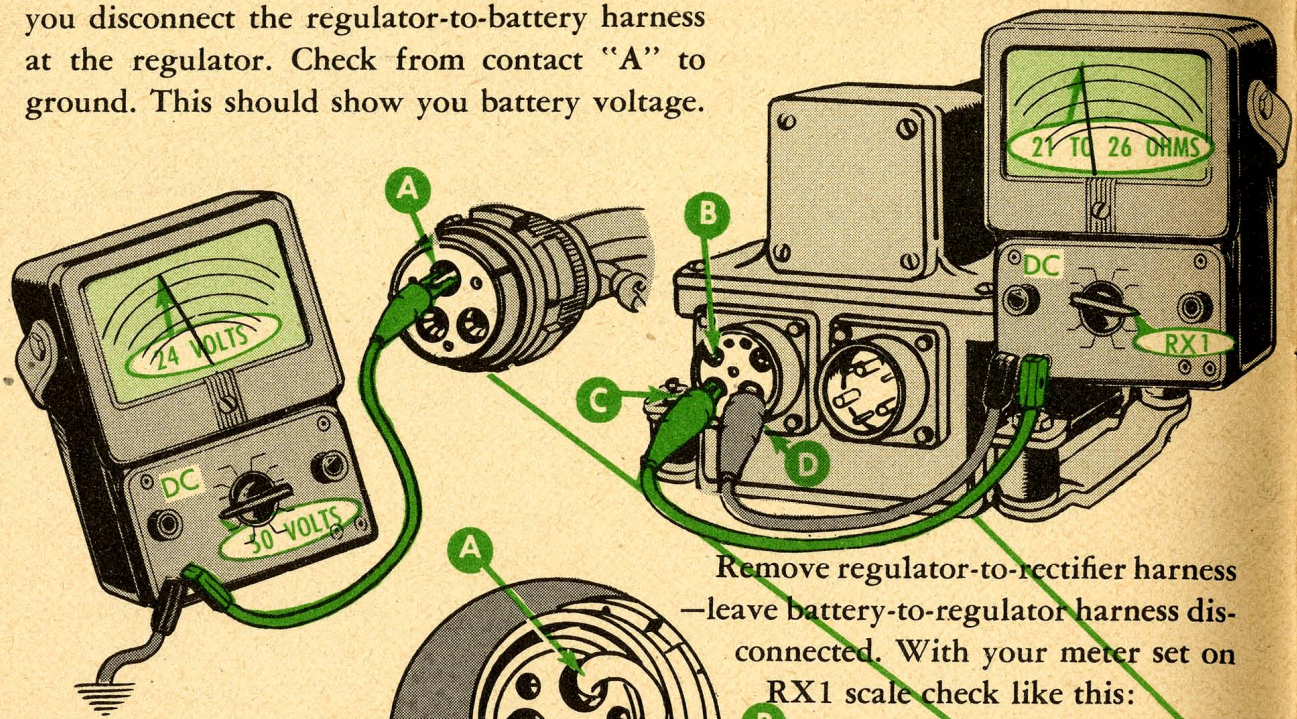
First of all, you make a visual check. Be sure the belts are not loose or broken, and that the alternator is turning. Then kill the engine and check for loose harnesses—all the connections tight? Take a good look at the rectifier—is it clean? Any burned or blistered paint? Any bent or obviously damaged plates? Anything you find by looking, you correct, of course. If this doesn't cure your troubles you have to go on into the meter checks.



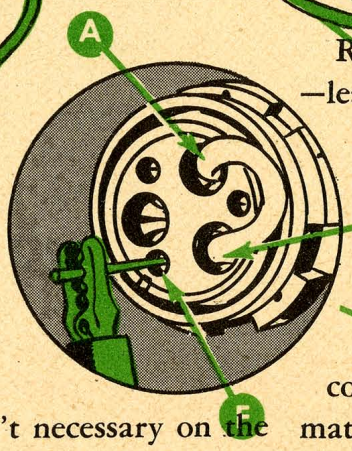
WHEELED VEHICLES



With the meter still set on the 50-volt DC scale you disconnect the regulator-to-battery harness at the regulator. Check from contact "A" to ground. This should show you battery voltage.



Now connect a jumper from contact "A" to contact "B", turn on the ignition switch and check from contact "F" to ground. The jumper isn't necessary on the M59. Just check "F" pin to ground. This also should show you battery voltage, or nearly so. So far you have established that the battery harness is OK, and that the circuit which is controlled by the ignition switch is also OK. If not, of course, you ran your trouble down in this circuit.



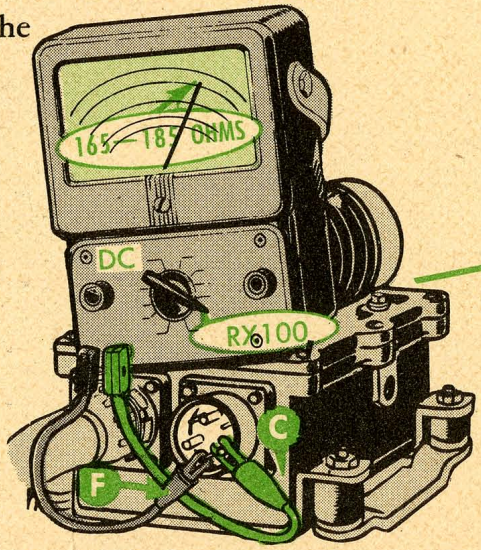
Now while the regulator-to-battery harness is disconnected, you can make Ohmmeter tests of the regulator. With your meter set on the "RX100" scale you check like this:

Remove regulator-to-rectifier harness —leave battery-to-regulator harness disconnected. With your meter set on RX1 scale check like this:

Socket "C" to socket "D", voltage control set at fully clockwise position—approximately 26 ohms.

With voltage control set at fully counterclockwise position—approximately 21 ohms.

Socket "C" to socket "B", carbon pile, approximately 1 ohm.



Pin "F" to pin "C", line switch coil, 175 ± 10 ohms.

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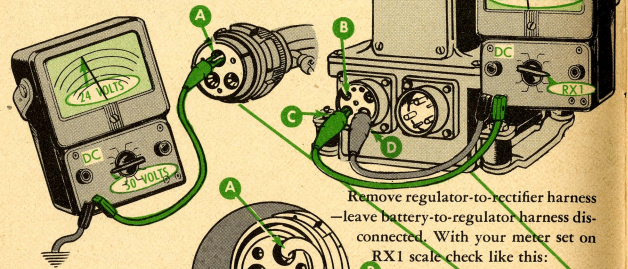

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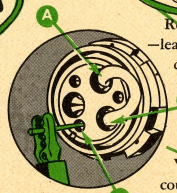

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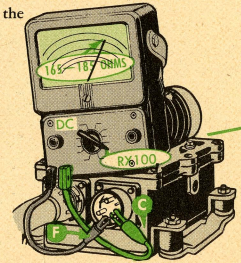

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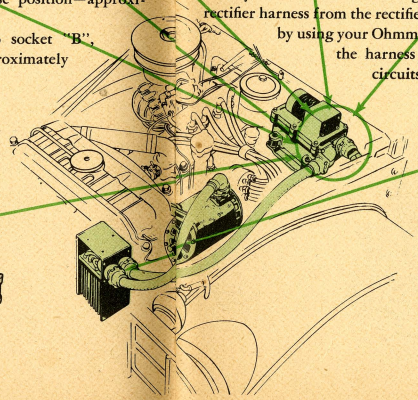
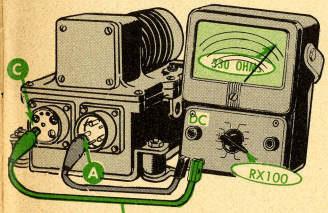
With voltage control set at fully counterclockwise position—approximately 21 ohms.

Socket "C" to socket "B", carbon pile, approximately 1 ohm.



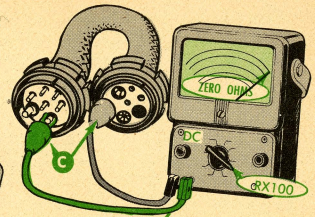
Now from pin "A" to socket "C", contact resistor with the meter on "RX100" scale. You should read approximately 330 ohms. (On later models this will be open circuit—reading, "infinite").



Any place you don't get the reading that's indicated for it, you've spotted a trouble spot.

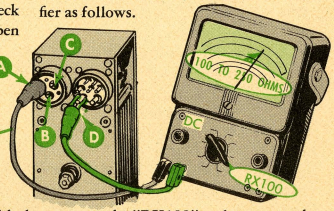
If you get the above readings from your regulator, chances are excellent that it is OK and your trouble is elsewhere.

So you now remove the regulator-to-rectifier harness from the rectifier too, and by using your Ohmmeter check the harness for open circuits.



Check from pin "C" at one end to socket "C" at the other, from pin "D" to socket "D" and so on, you should not get any noticeable resistance in any of the circuits. On wheeled vehicles with the meter on the "RX100" scale, check from each pin to the outer shield, and from each pin to the others, you should get infinite resistance (no reading) on all checks. If either of these tests indicates a faulty harness, replace it.

This brings you down to your rectifier. Disconnect the rectifier-to-alternator harness from the rectifier, and check the rectifier as follows.



With the meter on the "RX100" scale, connect the red lead (+) to the "D" pin on the rectifier-to-regulator side and touch the other lead to each of the three large sockets on the rectifier-to-alternator side (Sockets "A", "B", & "C"). You will get high resistance reading 100 to 250 ohms. If you get a variation of more than 25 ohms, your rectifier may be faulty.

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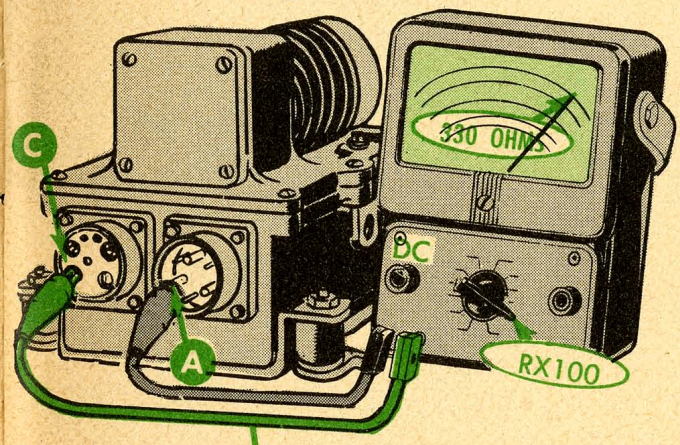

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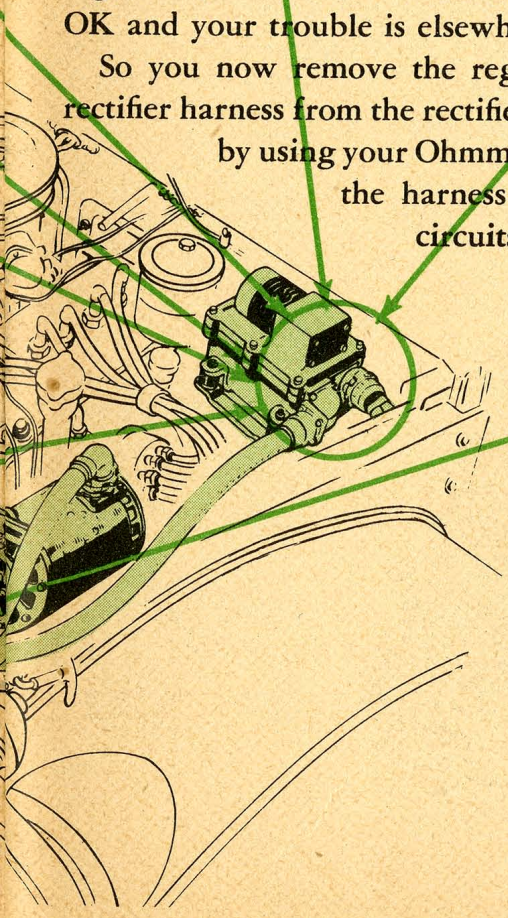

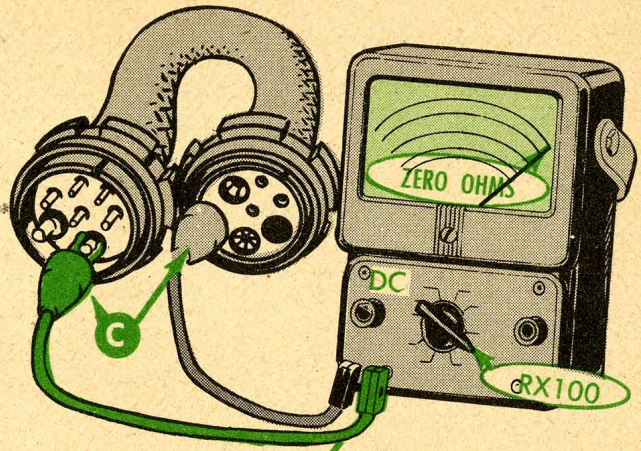

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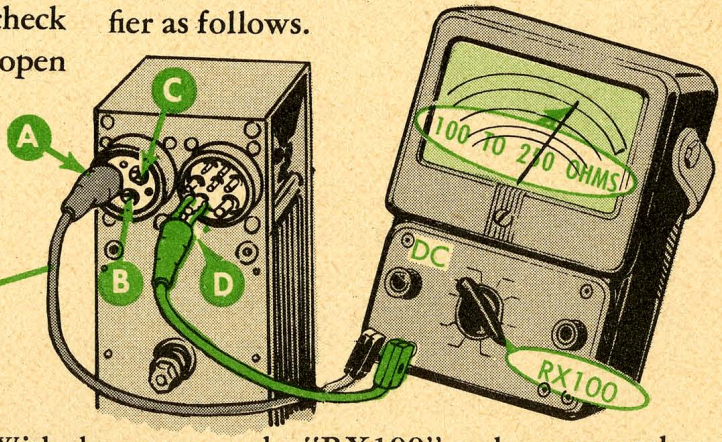

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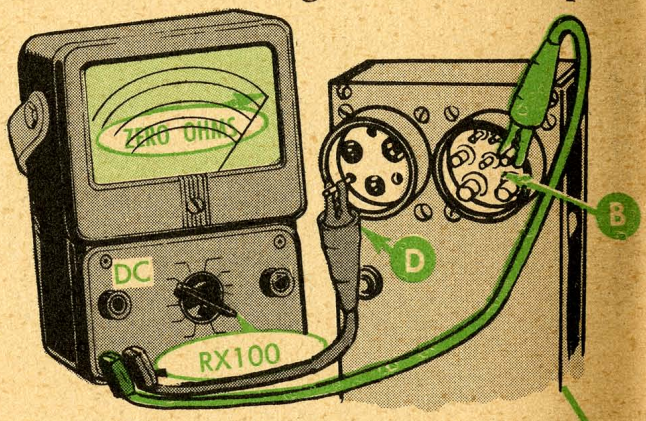
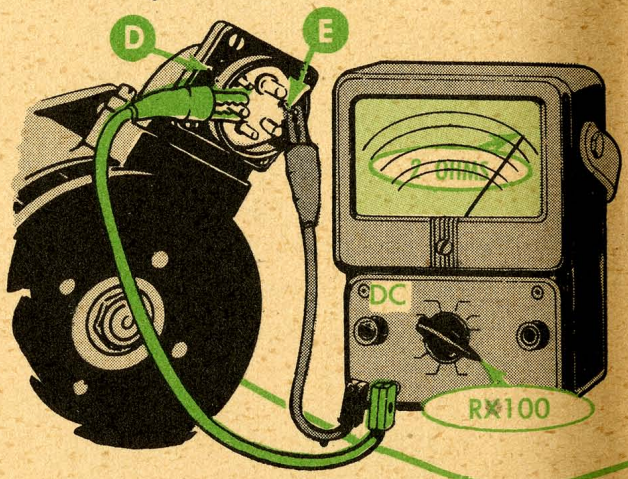
This checks half of the rectifier. For the other half place the black (−) lead on pin "C" rectifier-to-regulator side and touch the other lead (+) to each of the three large sockets on the rectifier-to-alternator side sockets "A", "B" and "C". You should get the same reading.

Before passing the rectifier as OK, check the field circuit through it. From small pin "B" to socket "D" and from small pin "E" to socket "E" you should have no appreciable resistance. While you cannot repair the rectifier, you can check this circuit for loose wires, since it consists simply of two jumpers running from one connector right over to the other one.

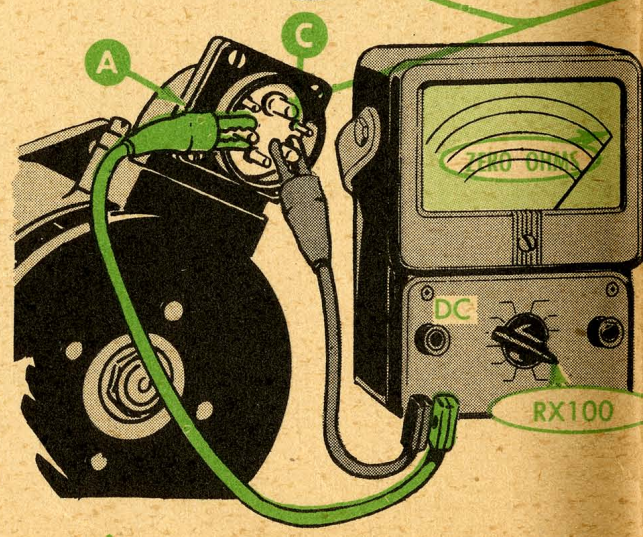


Your next step is to check out the rectifier-to-alternator harness just as you did the rectifier-to-regulator harness. Be sure all five leads are OK and that there are no shorts. (Actually, checking these harnesses is mostly routine.) Unless you can see evidence of external damage it's 100 to 1 they are OK, but it takes only a second to check and be sure.

Now you have come down to the alternator. This should check out like this: Pin "D" to pin "E" approximately 2 ohms. This is the rotor coil resistance. However, since you are checking through the brushes and the slip rings, any reading from 1.7 to 5 ohms is probably OK. Now from any one of the big pins, "A", "B" or "C" to the others, you should have no measurable resistance. With the meter on "RX100" scale, take a resistance check from each pin to the alternator ground. The reading should be infinite.



Somewhere along this list of checks you almost have to find one that didn't agree with the stated figures, or your system will work. However, the proof of the pudding comes when you hook everything up again except the alternator. While someone else turns on the ignition switch, listen carefully at the regulator box. You should hear the load relay close. Now check with your meter on the 50-volt DC scale and see if you get approximately battery voltage between small



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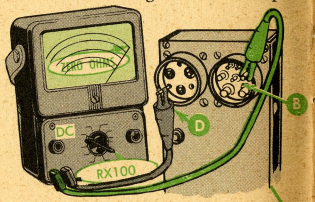

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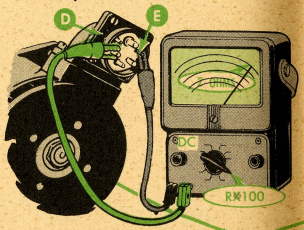

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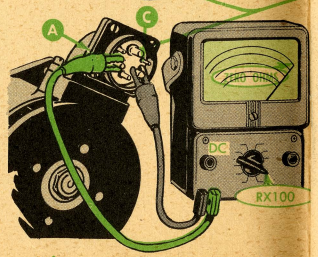

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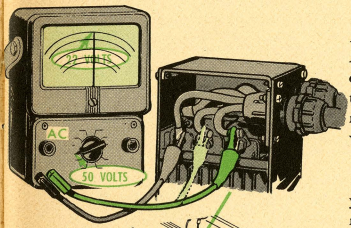

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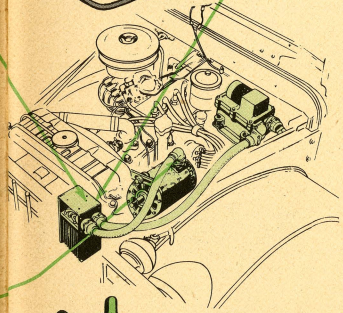
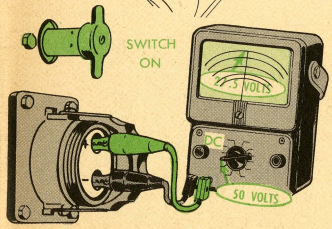


Now watch this one or it will fool you. Due to the peculiarities of AC current, your meter doesn't read the peak voltage of each back-and-forth (alternating) cycle, but only gets an average value. So, even though you have an output of 27.5 or more volts on the direct current side of the rectifier, you will only get a reading of about 22 volts on the AC side. It may not even be exactly 22 volts, but the point is, all three possible checks here should be very close to the same voltage. If they vary more than a volt, replace the alternator and send it back for checking.



Now on the M59's, you can switch your meter back to the 50-volt DC scale and check the DC voltage at the slave receptacle, which should be 27.5 if your adjustment is OK. On the wheeled vehicles, it is almost impossible to get at the DC terminals of the rectifier, so you go back to the starter terminal. Make your final adjustment of output voltage and button up. *(NOTE: On M59's, the voltage adjustment should be made with the master switch* **open** *and no load except the ignition.)*

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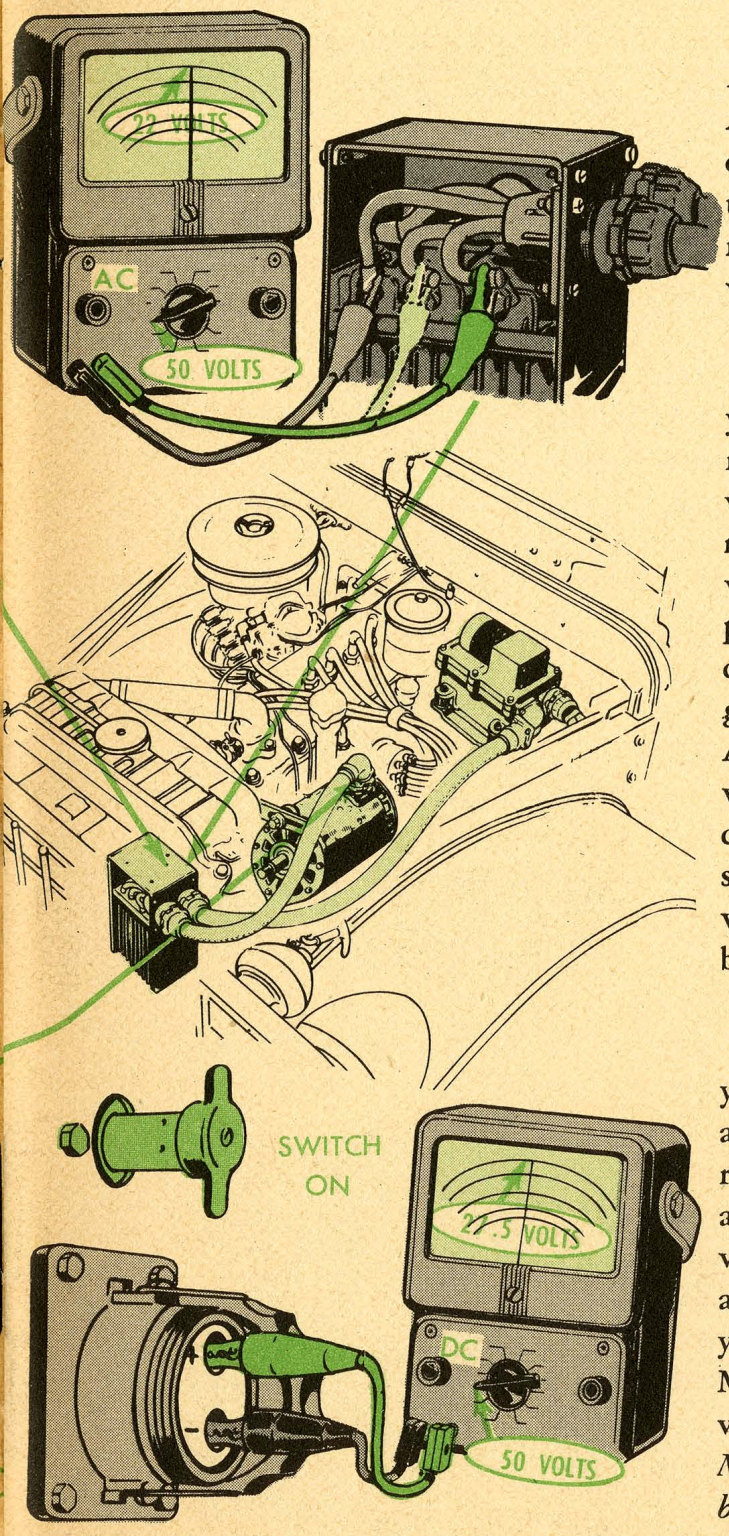

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TESTING THE 100-AMPERE AC CHARGING SYSTEM WITH THE LOW-VOLTAGE CIRCUIT TESTER

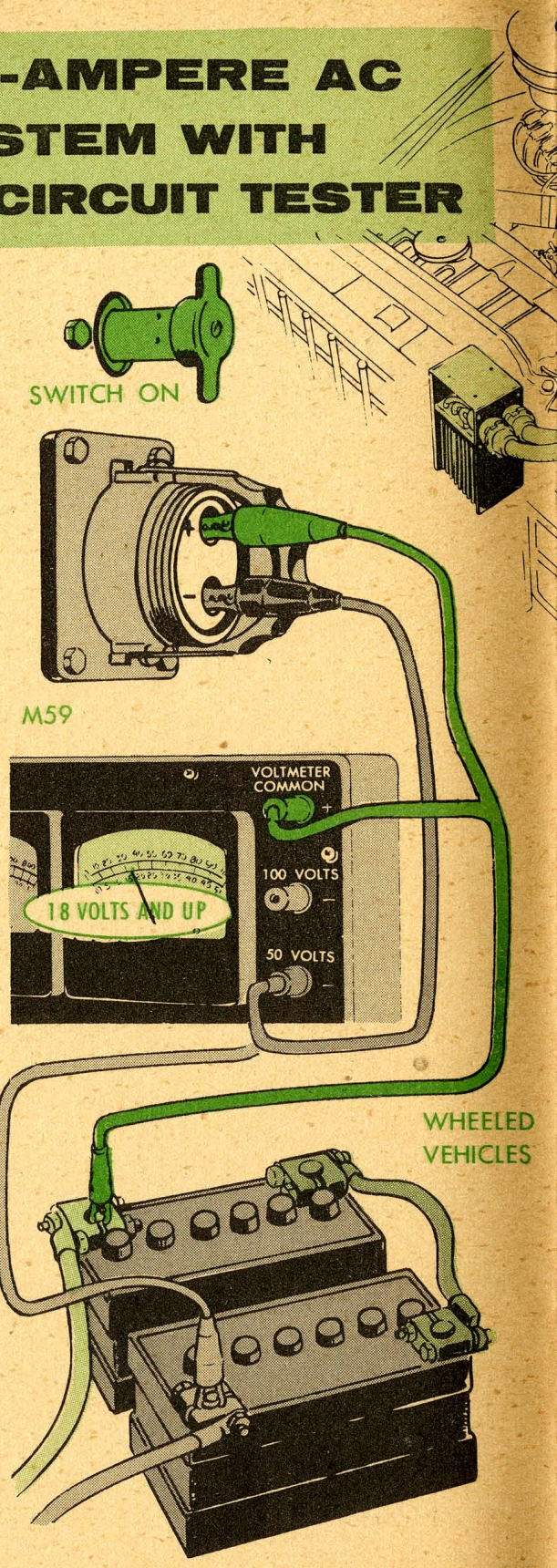
That's the way of it IF you can get a volt-ohmmeter with AC-DC-scales. Now if you can't get this kind of a meter, you **can** get by with the old Low-Voltage Circuit Tester 17-T-5575-50 and a 24-volt test lamp. The checks take longer to make, and are not as accurate, but you can isolate the faulty part of your system and change it. Here's how you do it!

If all you can get your hands on to check out your system is the Low-Voltage Circuit Tester, you will also need a couple of jumper leads—with clips on their ends if you can get 'em—and a 24-volt test lamp. (The driver's warning lamp from a tank makes a good one.)

Your series of tests follows very closely those described above for the ohmmeter, with some differences due to the limitations of the equipment.

You start with a battery check, which can be made at the slave receptacle of the M59's, or at either the batteries or the starter terminal of the wheeled vehicles. If you find you have less than 18 volts while the starter is cranking the engines, *(NOTE: M59 master switch* ***ON****, right ignition switch* ***ON****, left ignition switch* ***OFF*** *and press left starter switch and don't crank for longer than 30 seconds)* you replace or recharge your batteries.

Then start your engine, and observe the voltmeter again. If the voltage rises above the battery voltage, your system is charging.



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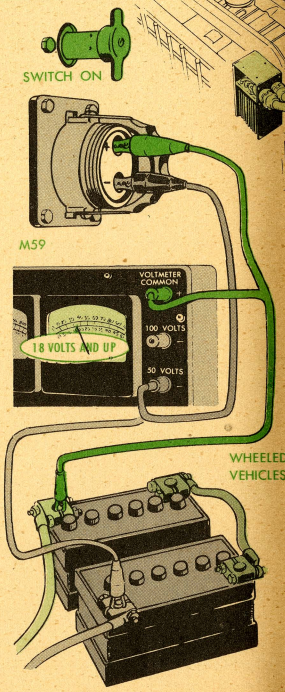
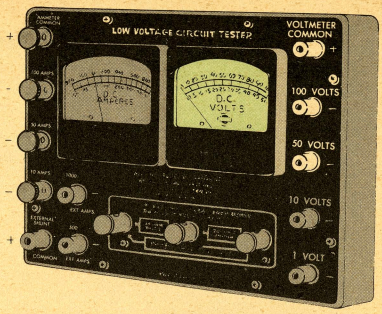
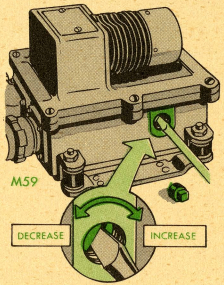
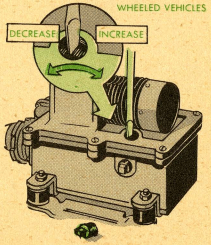


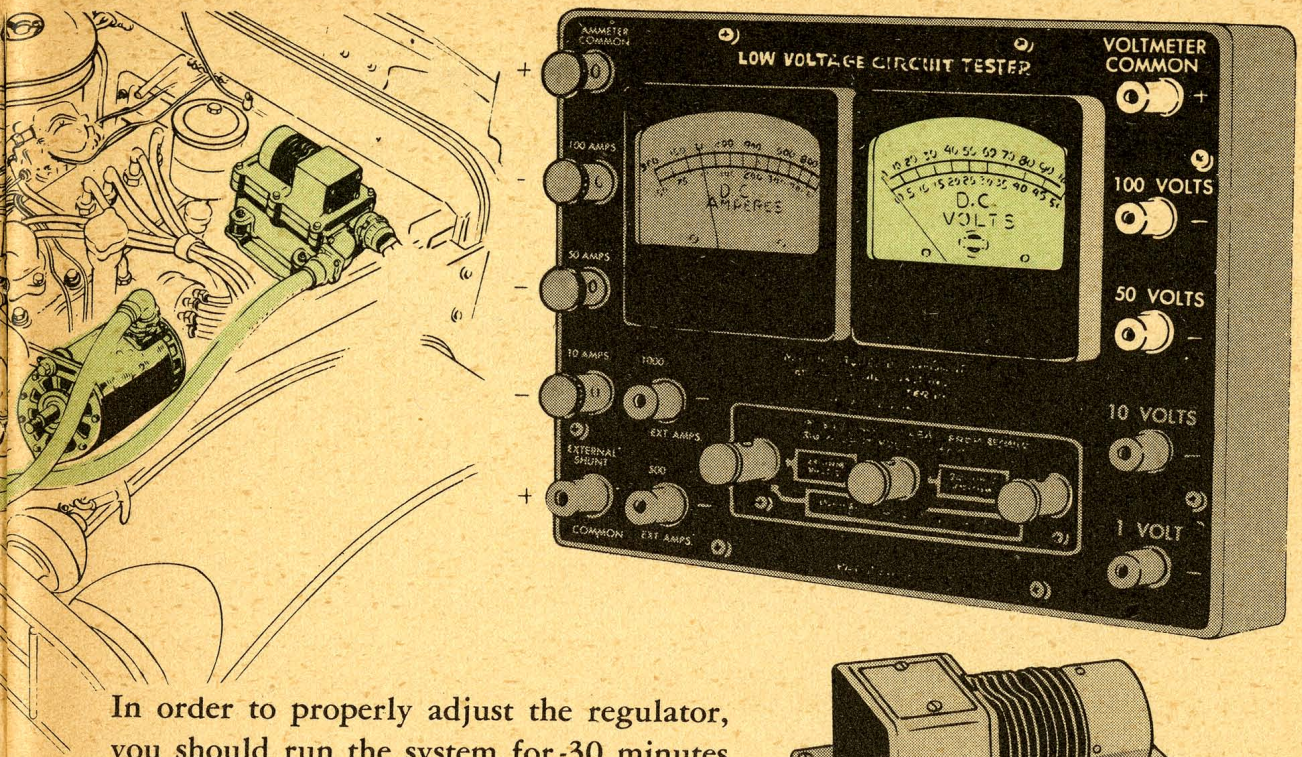


In order to properly adjust the regulator, you should run the system for 30 minutes with the headlights turned on to provide a load. This will also top up your battery charge. Now, on the M59's, you open the master switch to read the voltage, which should be 27.5.

Now, on the M59's you take out the pipe plug on the side of the control box and look in. You will see a slotted shaft into which you fit a screwdriver. Turning this shaft, which controls the voltage adjusting rheostat **clockwise** will **increase** the voltage. Turning it **counterclockwise** will **decrease** the voltage. On the M37's and some other vehicles equipped with the 100-Ampere, AC-DC system, the regulator box also has a plug in the cover, removable with a wrench. Looking down this hole, you will see a black knurled disk which is on the shaft of the rheostat. As installed on the M37 you would turn the top of this disk to the **center** of the vehicle to **increase** voltage, **outward** to **decrease** it. Set your voltage to 27.5, and you're set.







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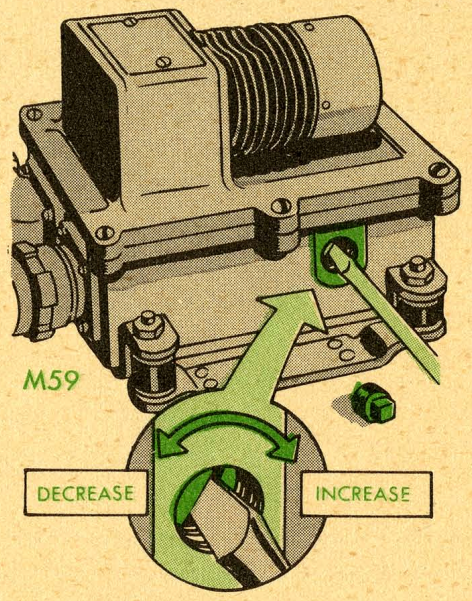
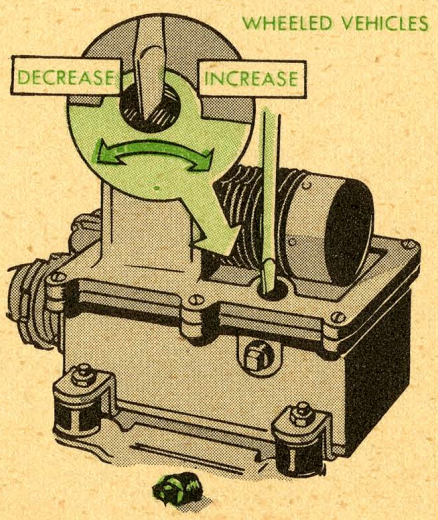
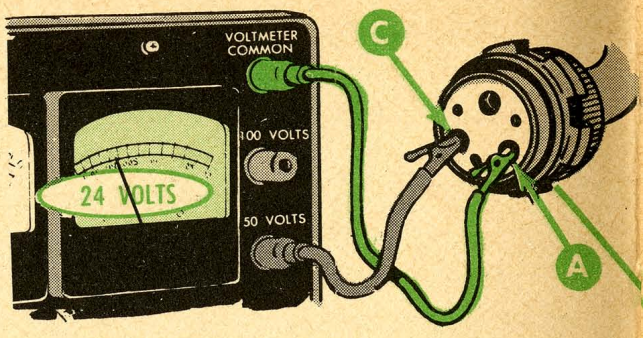
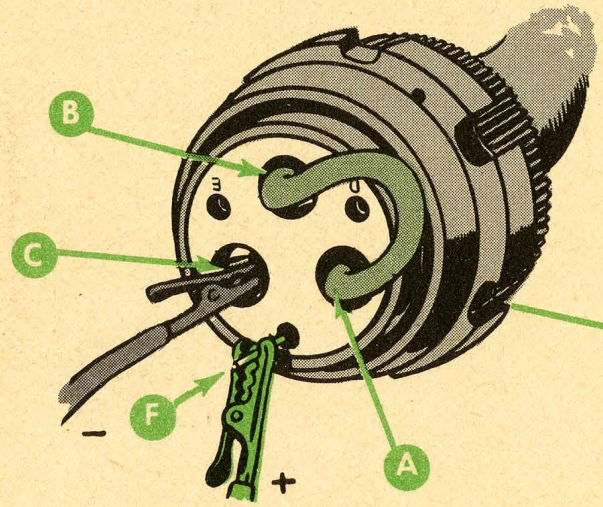




If your system voltage does not rise above battery voltage after you start the engine, you have troubles, and must run them down. The first check you make is on the regulator-to-battery harness. With the positive lead plugged into the tester at "Voltmeter Common" and the negative lead plugged into the "—50-volt" post on the tester, you check from socket "A" (Positive) to socket "C" (Negative) and you should get battery voltage. (Remember, on the M59's, the master-switch must be ON.)

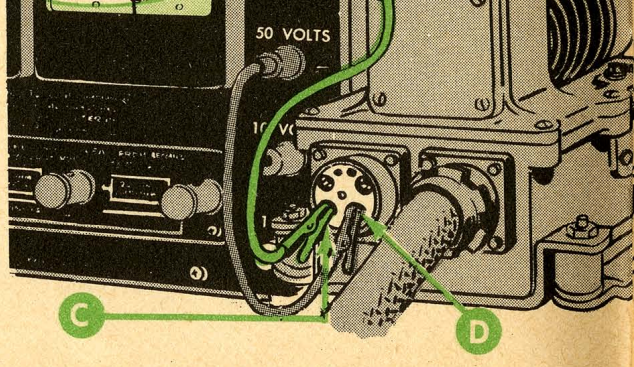




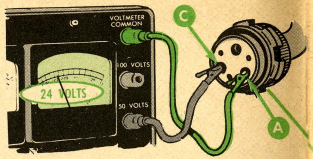
Using a short piece of $\frac{1}{16}$-in welding rod, a fourpenny box nail or an open paper clip to get into the small socket, you connect the positive lead from your voltmeter to small socket "F". Next you insert the short jumper from the tester accessories into large socket "A" and large socket "B". (You'll only need the jumper for wheeled vehicles).

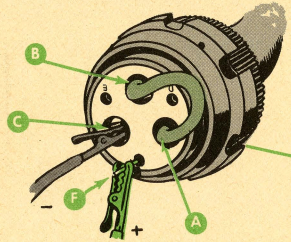
Now when you turn the ignition switch on, you should indicate approximately battery voltage on the meter. (You can leave your voltmeter negative lead in socket "C", or to get more room to work, you can move it to any good ground on the vehicle.)

OK, so your first harness is in good order. Now you re-connect it to the regulator, and disconnect the regulator-to-rectifier harness at the regulator end. Your first check here is to determine that the load relay is closing and that the connections are OK. You put your positive voltmeter lead into large socket "C" and the negative lead into large socket "D". When you turn on the ignition switch, you should get battery voltage. If not, replace the regulator.



If your system voltage does not rise above battery voltage after you start the engine, you have troubles, and must run them down. The first check you make is on the regulator-to-battery harness. With the positive lead plugged into the tester at "Voltmeter Common" and the negative lead plugged into the "—50-volt" post on the tester, you check from socket "A" (Positive) to socket "C" (Negative) and you should get battery voltage. (Remember, on the M59's, the master-switch must be ON.)

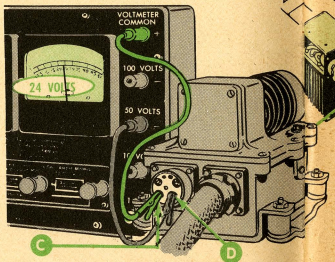




Using a short piece of $\frac{1}{16}$-in welding rod, a fourpenny box nail or an open paper clip to get into the small socket, you connect the positive lead from your voltmeter to small socket "F". Next you insert the short jumper from the tester accessories into large socket "A" and large socket "B". (You'll only need the jumper for wheeled vehicles).

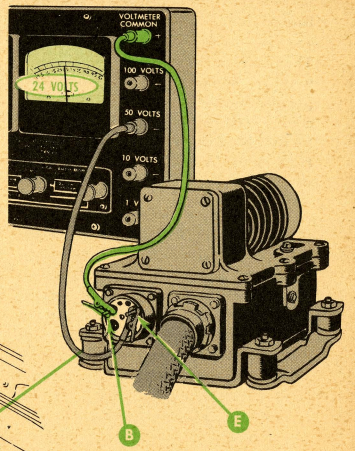
Now when you turn the ignition switch on, you should indicate approximately battery voltage on the meter. (You can leave your voltmeter negative lead in socket "C", or to get more room to work, you can move it to any good ground on the vehicle.)

OK, so your first harness is in good order. Now you re-connect it to the regulator, and disconnect the regulator-to-rectifier harness at the regulator end. Your first check here is to determine that the load relay is closing and that the connections are OK. You put your positive voltmeter lead into large socket "C" and the negative lead into large socket "D". When you turn on the ignition switch, you should get battery voltage. If not, replace the regulator.



At this point you must now check the field circuit. Using your pins to get into the sockets, connect your voltmeter positive lead to socket "B" and the voltmeter negative lead to socket "E". (These are the middle-sized sockets on this connector.) Again if you fail to indicate approximate battery voltage, you replace the regulator.

If the regulator is OK, you reconnect the regulator-to-rectifier harness at the regulator, and disconnect it from the rectifier. You repeat your checks at this end of the harness, both on the heavy sockets and on the field circuit.



Now you are ready to check the rectifier. As said above, you first give it a thorough visual check. Be sure it is clean, not bent or damaged, and that there is no evidence of burned and blistered paint. (A slight blackening of the paint does not necessarily indicate a faulty rectifier, but blistered or flaked paint and a reddish color means she's gone.)

If the rectifier **looks** OK, you are ready to make the electrical checks on it. These checks are not 100% satisfactory, but are the best you can make with the equipment you have, and they will give you a basis from which to replace the rectifier or continue it in service.

At this point you must now check the field circuit. Using your pins to get into the sockets, connect your voltmeter positive lead to socket "B" and the voltmeter negative lead to socket "E". (These are the middle-sized sockets on this connector.) Again if you fail to indicate approximate battery voltage, you replace the regulator.

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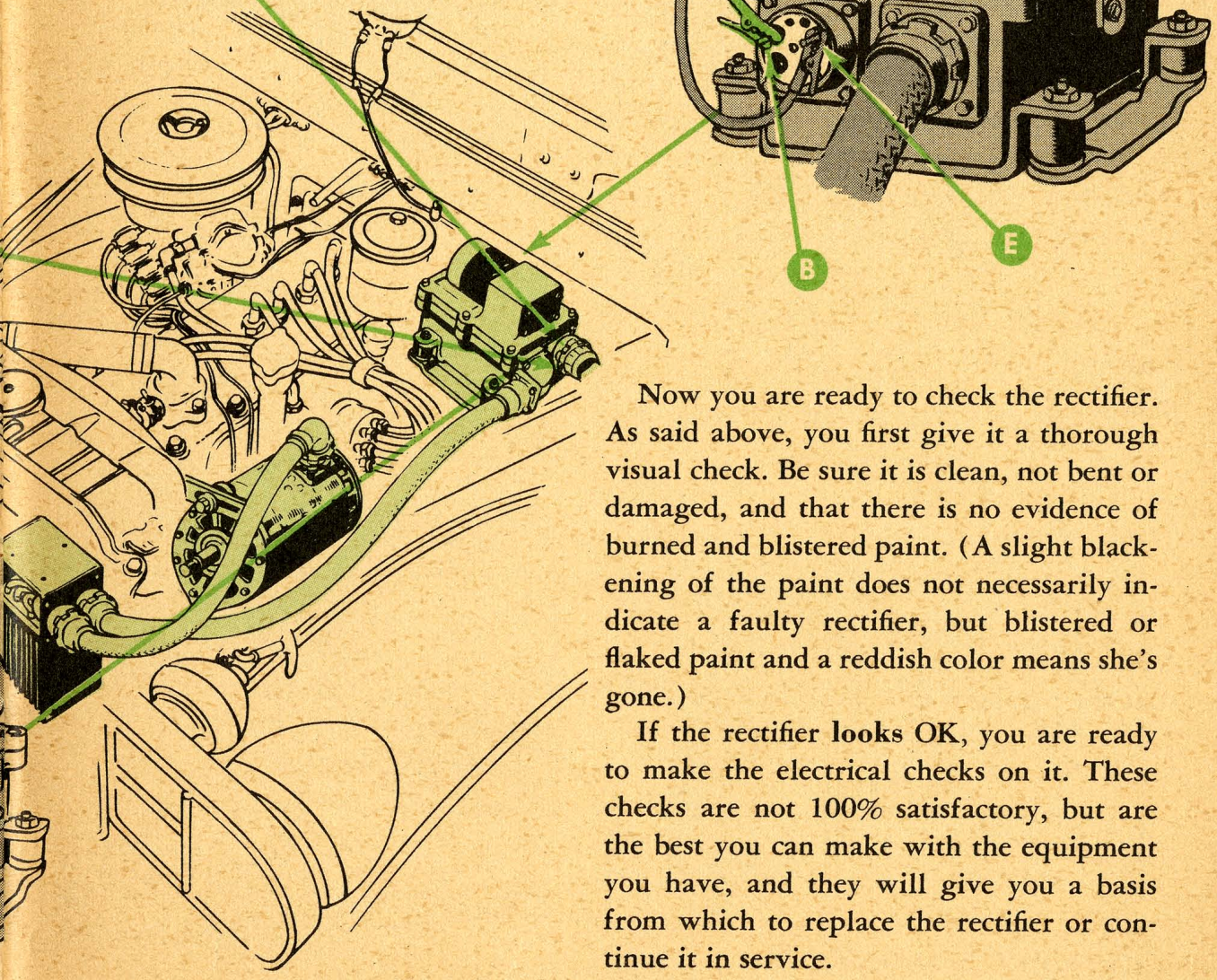

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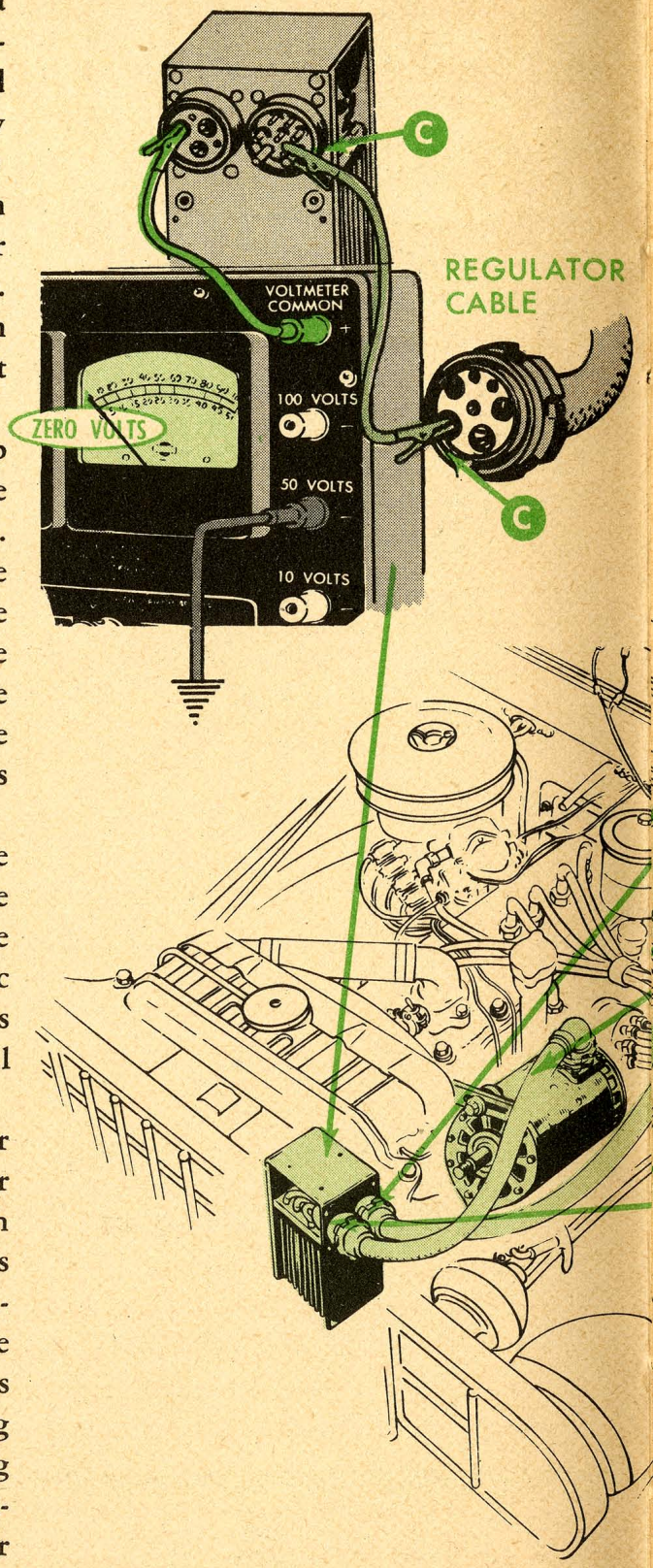
Follow this one closely, 'cause it's a doozey: Disconnect the rectifier-to-alternator harness from the rectifier. (Wheeled vehicle men will have taken this off anyhow to get at the rear harness for the last check.)

Now, connect your short jumper from large socket "C" of the regulator-to-rectifier harness to large pin "C" on the rectifier. With your master-switch and ignition turned on you will have battery voltage at this point, remember?

OK, so now you ground the negative clip of your voltmeter lead either to the vehicle frame or to large socket "D" of the harness. (Leave the negative lead plugged into the 50-volt post of the tester.) Now, with the positive lead from the tester, touch the three large sockets on the alternator side of the rectifier. You should get no appreciable voltage. (A slight flicker of the needle is OK.)

Now move the jumper lead over to large pin "D" on the rectifier connector. (Remove the jumper from the hot socket "C" while changing the connections so you won't arc it, replace it when you are finished.) This time you should find battery voltage at all three of the large sockets. OK?

(If and when you have available either the Carbon Pile and Field Rheostat box or the new Low-Voltage Circuit Tester with the built-in Carbon Pile, you will make this test the same way, but you will use the ammeter and the carbon pile, and will load the pile until you are drawing 25 amperes through the rectifier instead of just checking for voltage. This will reveal any pending breakdown in the rectifier. But in the meantime, the voltage test will give you a fair idea how things are.)



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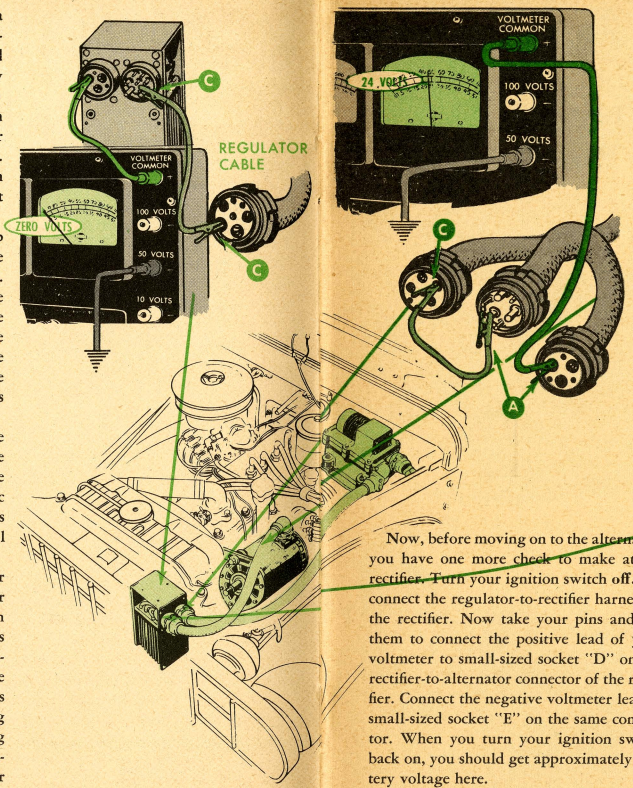
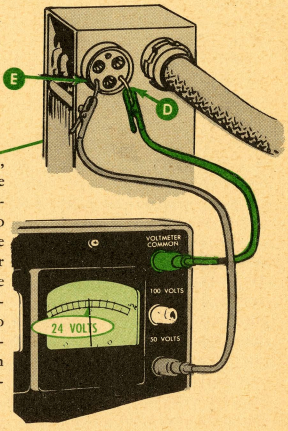
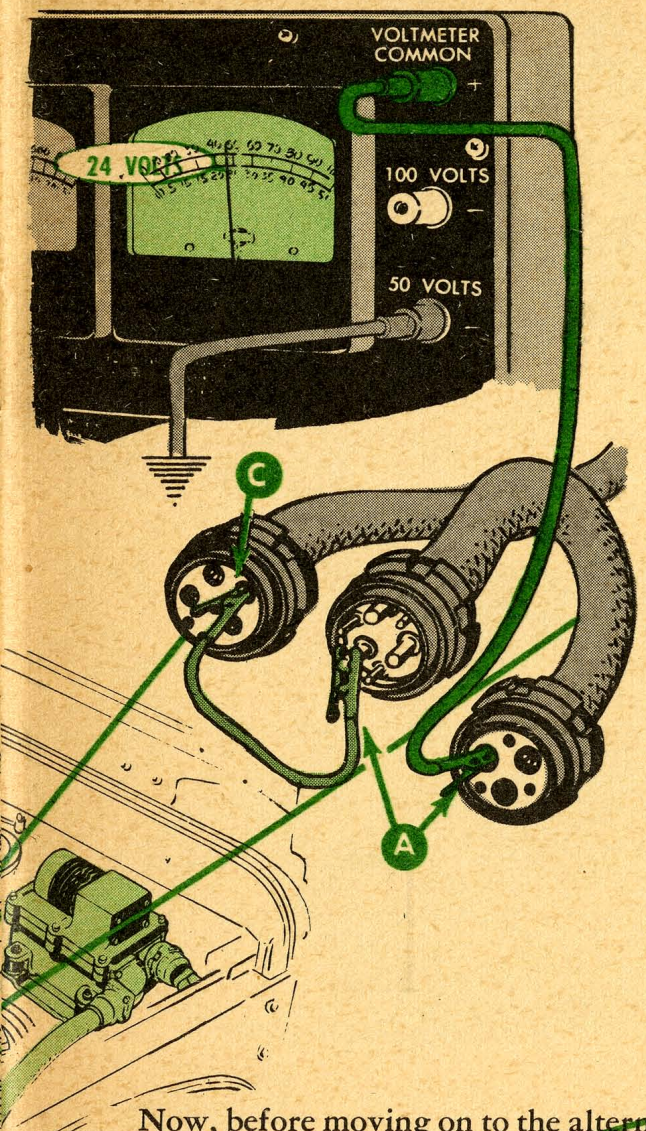


This is the best time at which to check out your rectifier-to-alternator harness also. Disconnect it from the alternator. Now take your jumper and connect it from any one of the large pins, "A", "B" or "C" to the hot socket "C" on the regulator-to-rectifier harness. Connect the jumper to the pin **first**, then to the hot socket, to prevent arcing. With your voltmeter still grounded to either the frame or the ground socket "D", check that socket on the alternator end of the rectifier-to-alternator harness which corresponds to the pin you are applying current to. You should get battery voltage. Repeat the test with the other two large pins and sockets. (This simply shows you that there is no open circuit or break in the heavy leads within the harness.)

Now, before moving on to the alternator, you have one more check to make at the rectifier. Turn your ignition switch **off**. Reconnect the regulator-to-rectifier harness to the rectifier. Now take your pins and use them to connect the positive lead of your voltmeter to small-sized socket "D" on the rectifier-to-alternator connector of the rectifier. Connect the negative voltmeter lead to small-sized socket "E" on the same connector. When you turn your ignition switch back on, you should get approximately battery voltage here.





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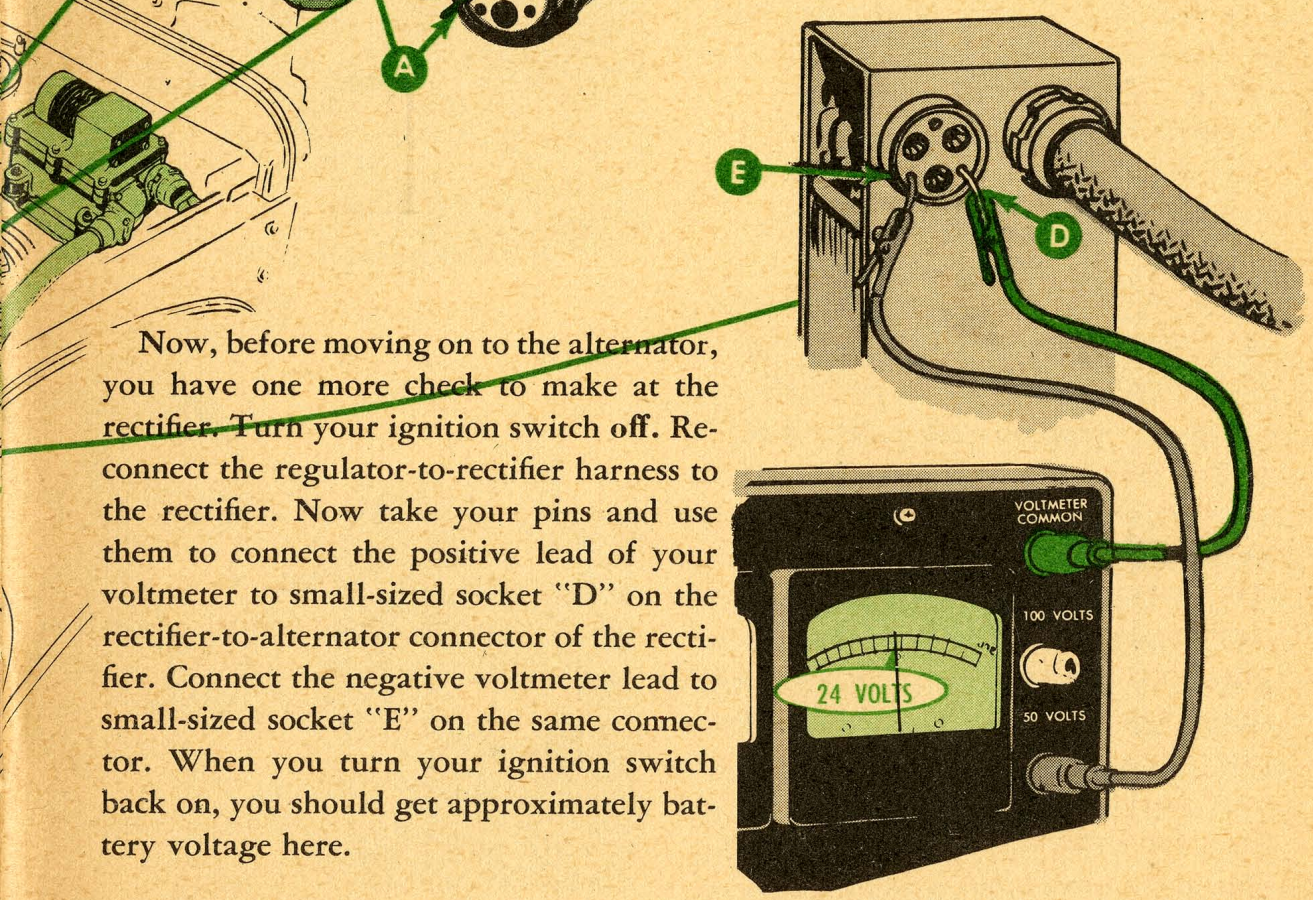

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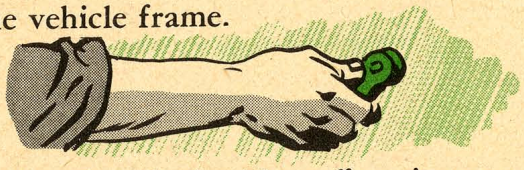
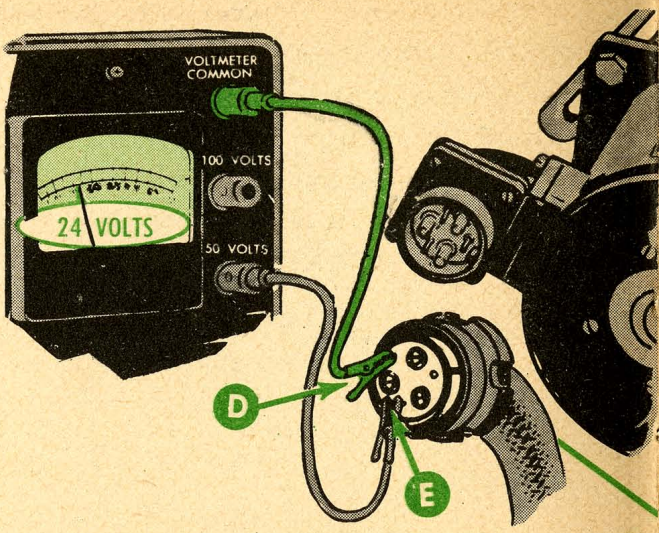
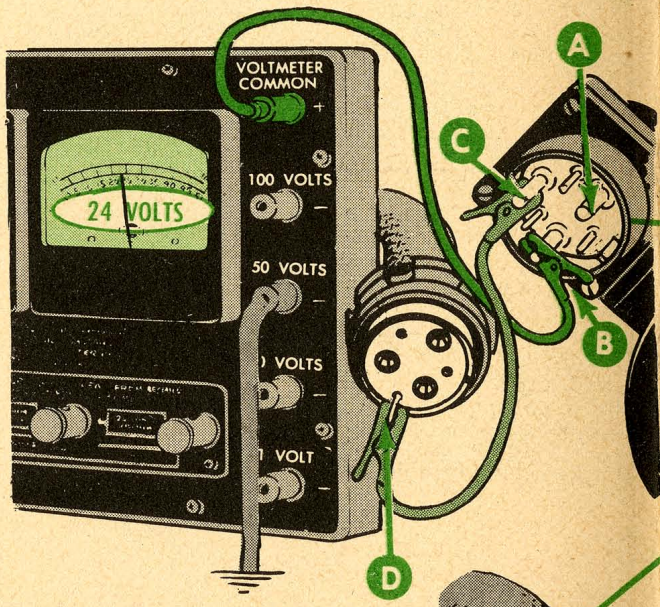
OK, now turn off the ignition switch again and re-connect the rectifier-to-alternator harness to the rectifier. Move down to the alternator end and repeat this field-circuit check. Put your pins in the small-sized sockets, and connect your voltmeter positive lead to "D" and the negative lead to "E". When you turn on the ignition, you should again have approximately battery voltage.

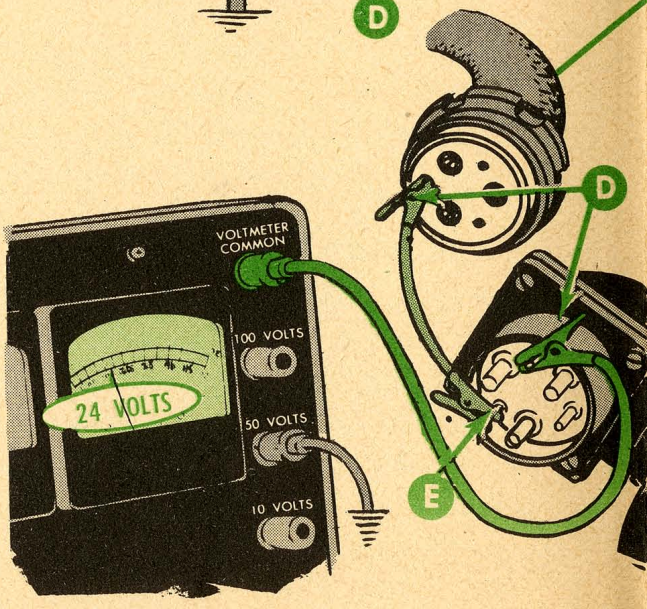
Now, with the ignition switch off, connect your jumper from small socket "D" of the rectifier-to-alternator harness to any one of the three large pins of the alternator connector. With the ignition **on**, you should get battery voltage at both of the other two large pins. Check with the positive lead of your voltmeter, ground the negative lead to the vehicle frame.



Turning the ignition off again to prevent arcing, move the jumper clip from the large pin to small-sized pin "D" or "E" on the alternator connector. Put your positive voltmeter lead on the other small-sized pin ("E" or "D", it doesn't matter which way you make this check) with the voltmeter negative lead grounded to the vehicle frame, turn the ignition back on. You should get approximately battery voltage from this test. If either of the above tests fail to work out, replace the alternator. Get a 110-volt test light. Use it to check for shorts from all pins to ground. It should not light.







OK, now turn off the ignition switch again and re-connect the rectifier-to-alternator harness to the rectifier. Move down to the alternator end and repeat this field-circuit check. Put your pins in the small-sized sockets, and connect your voltmeter positive lead to "D" and the negative lead to "E". When you turn on the ignition, you should again have approximately battery voltage.

Now, with the ignition switch off, connect your jumper from small socket "D" of the rectifier-to-alternator harness to any one of the three large pins of the alternator connector. With the ignition on, you should get battery voltage at both of the other two large pins. Check with the positive lead of your voltmeter, ground the negative lead to the vehicle frame.

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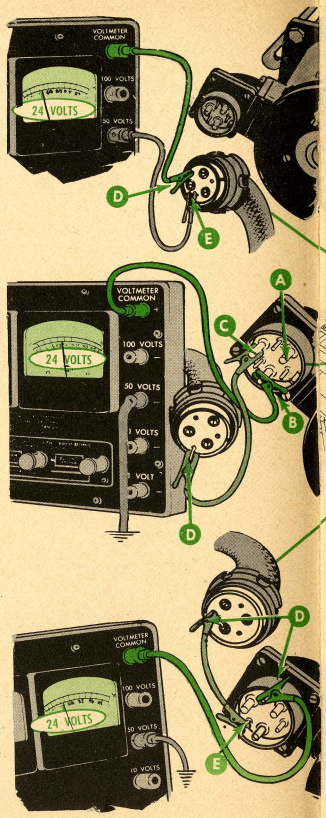
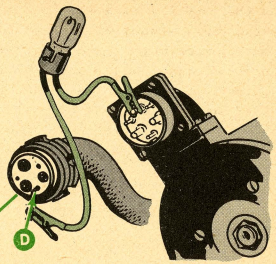


Now turn off the ignition, then get yourself a 24-volt test light. Connect one lead to the "D" pin on the alternator harness then turn on the ignition switch. With the test light's other lead touch each pin in the alternator connector. If test light "lights" at any pin replace alternator.



Now you have established the fact that you are getting field current all the way down to the alternator. You know that the alternator field circuit is not open. With the test light test you know that the alternator is not shorted out, either in the field or in the stator. You assume, then, that the alternator will produce current. Let's see if it does.

Checking all the harnesses for tightness, start up the engine and run it at about 700-800 RPM (High Idle). With your 24-volt test lamp, check from any one of the three AC terminals on the rectifier (three terminals all on one side, the front side in wheeled vehicle installations, and coded with yellow dots) to the other two in turn. Your lamp should light up each time. If not, repeat the field circuit test at the alternator, and if you have battery voltage there, replace the alternator and try again.

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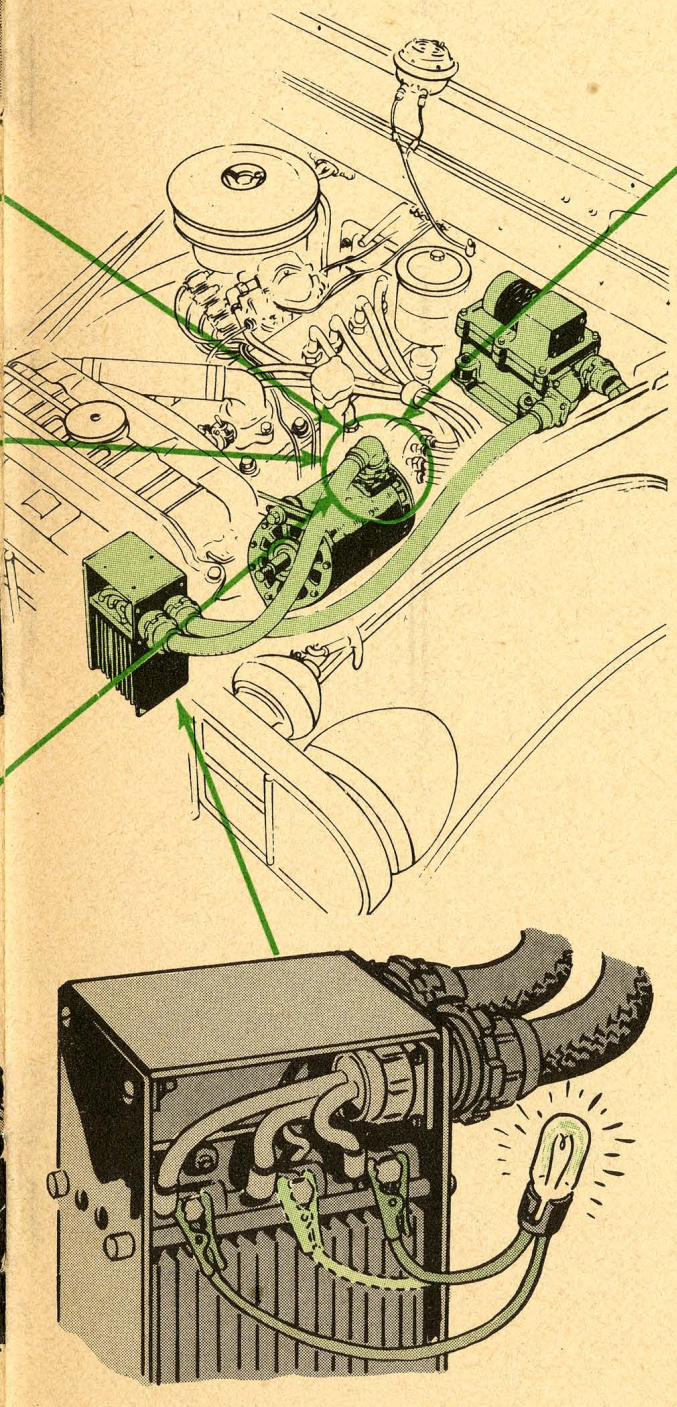

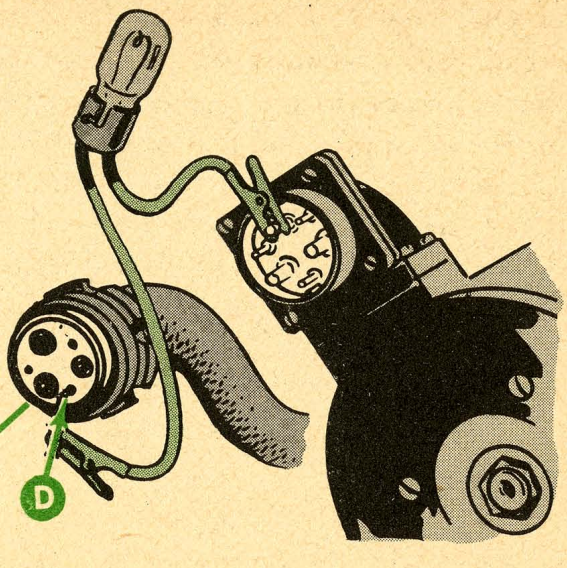

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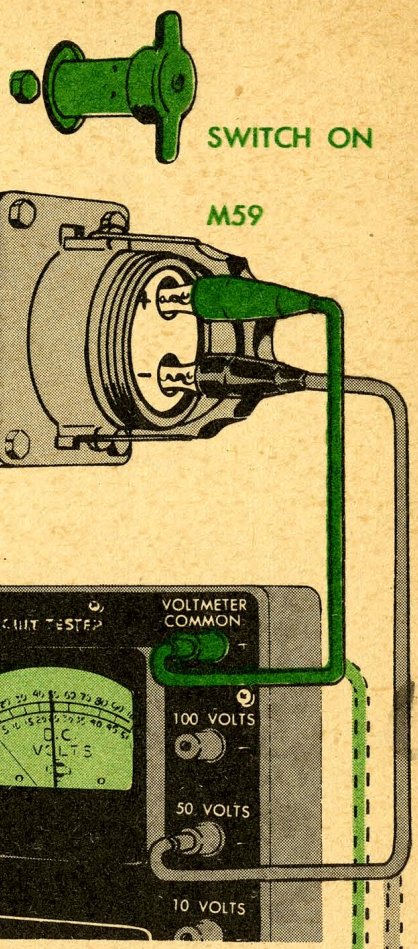
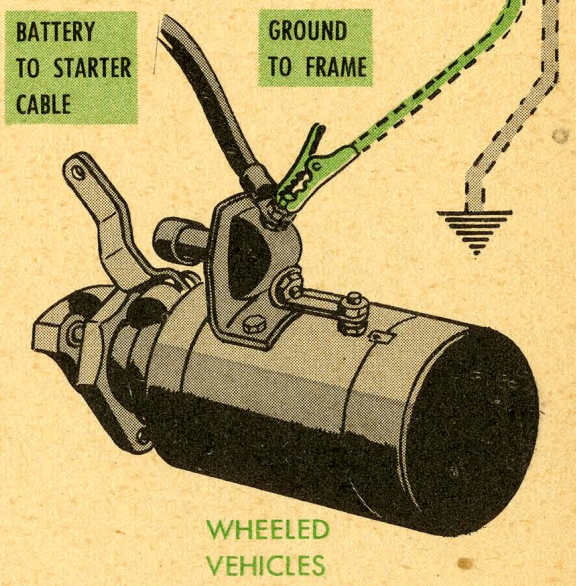
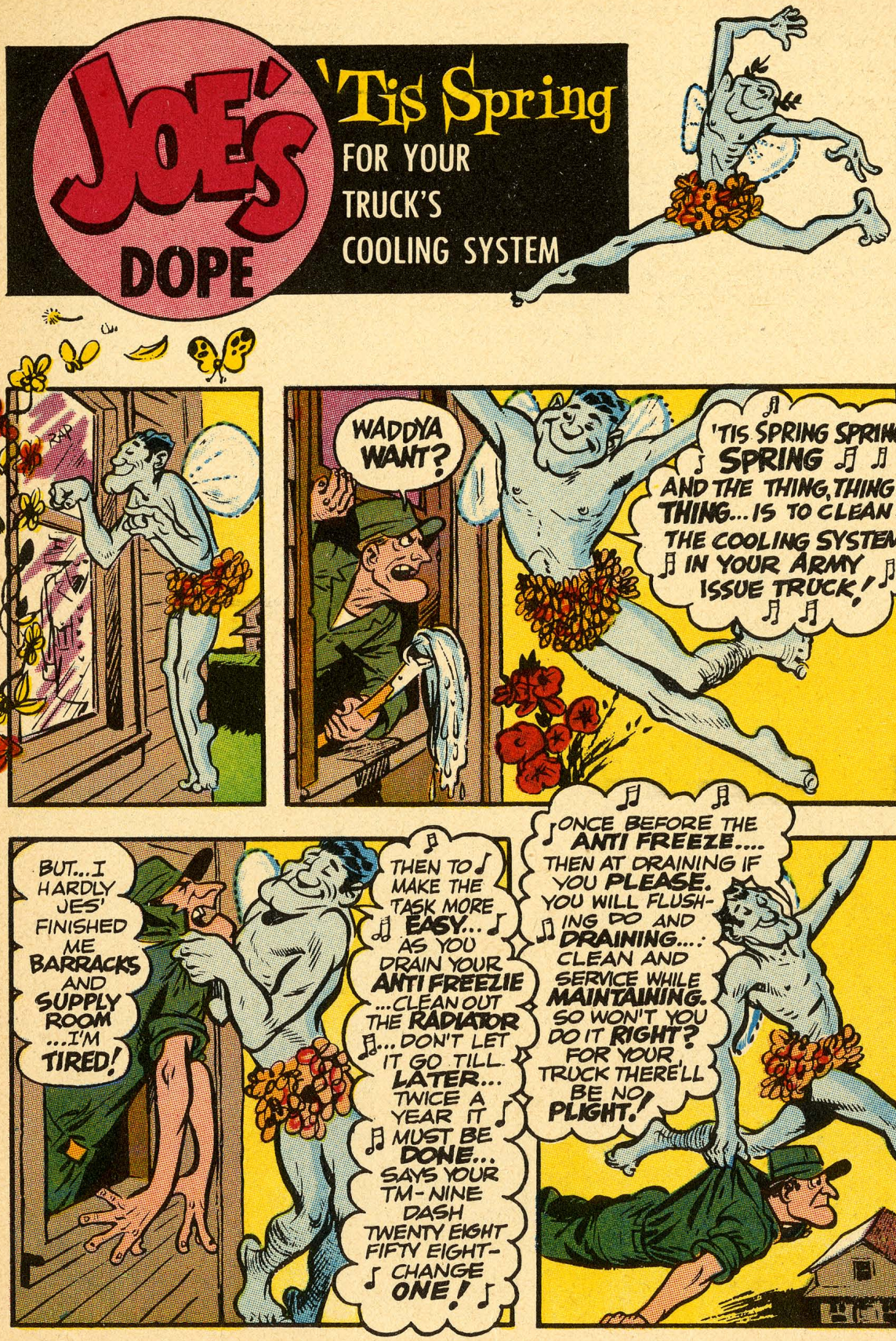
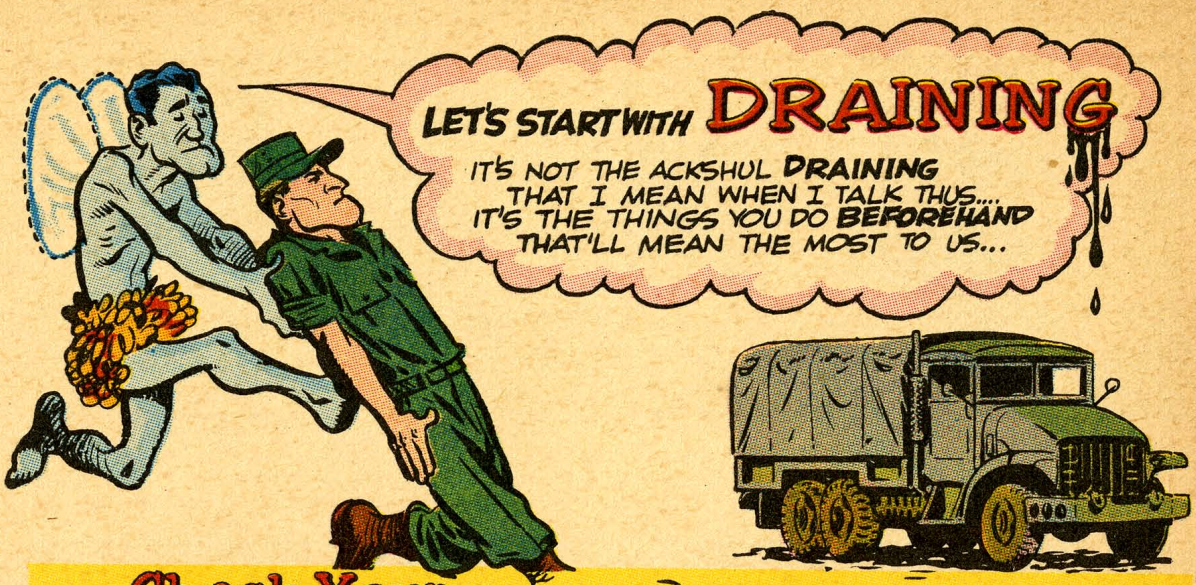
OK, so you now know that your alternator is putting out. Go back to your slave receptacle on the M59's or the starter post on the wheeled vehicles, and connect your voltmeter again as you did in the first test of the series. You should now get an indication that the system is putting out. If you have replaced either the alternator, the rectifier or the regulator to get it to work, you will have to warm the system up for 15 to 20 minutes with the headlights on and then check and possibly adjust your voltage to 27.5.

All this reads like a hell of a lot of work. Actually, after you have checked out a couple of systems, you will find that you can do it, either with the Ohmmeter or the LVCT a lot quicker than you can read these instructions. One short cut you may want to use. Some guys prefer to go right from the battery voltage test to the check of the field current at the alternator-to-rectifier harness to see if the field circuit is open. Can if you like.

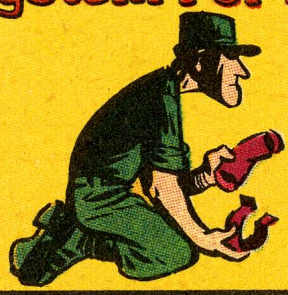




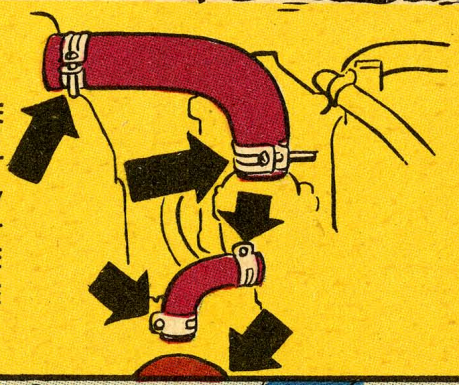

JOE'S DOPE
'Tis Spring
FOR YOUR TRUCK'S COOLING SYSTEM
RAP
WADDYA WANT?
'TIS SPRING SPRING SPRING AND THE THING, THING, THING... IS TO CLEAN THE COOLING SYSTEM IN YOUR ARMY ISSUE TRUCK!
BUT... I HARDLY JES' FINISHED ME BARRACKS AND SUPPLY ROOM ...I'M TIRED!
THEN TO MAKE THE TASK MORE EASY... AS YOU DRAIN YOUR ANTI FREEZIE ...CLEAN OUT THE RADIATOR ... DON'T LET IT GO TILL LATER... TWICE A YEAR IT MUST BE DONE... SAYS YOUR TM-NINE DASH TWENTY EIGHT FIFTY EIGHT-CHANGE ONE!
ONCE BEFORE THE ANTI FREEZE.... THEN AT DRAINING IF YOU PLEASE. YOU WILL FLUSH-ING DO AND DRAINING...: CLEAN AND SERVICE WHILE MAINTAINING. SO WON'T YOU DO IT RIGHT? FOR YOUR TRUCK THERE'LL BE NO PLIGHT!



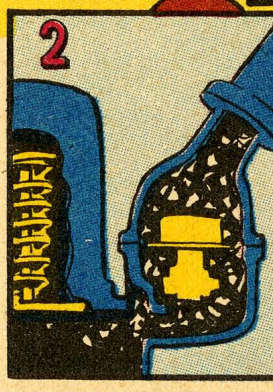
Check Your System For Leaks



NOW'S THE TIME TO CORRECT ALL LEAKS OR DRIPS, ESPECIALLY NUISANCE STUFF LIKE REPLACING HOSE CLAMPS

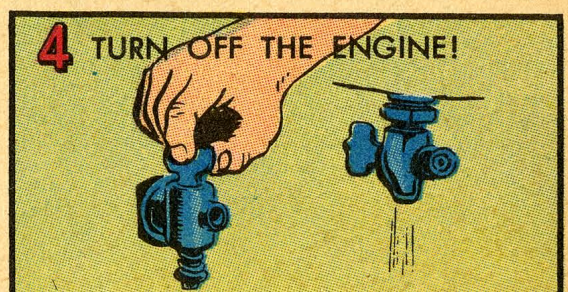


START UP YOUR ENGINE AND RUN IT AT A FAST IDLE... UNTIL THE TEMP GAGE READS AT NORMAL OPERATING TEMPERATURE



ALL THAT RUST AND SCALE WILL BE STIRRED UP BY THIS ACTION AND WILL FLOW OUT WITH THE COOLANT EASIER

ARMED WITH YOUR TRUSTY TM, LOCATE THOSE VALVES AND DRAINS WHICH LET WATER OUT... SO YOU CAN'T MUFF THE HEATERS AND WATER COOLED COMPRESSORS AND ANY OTHER WATER COOLED UNITS AS WELL AS THE ENGINE

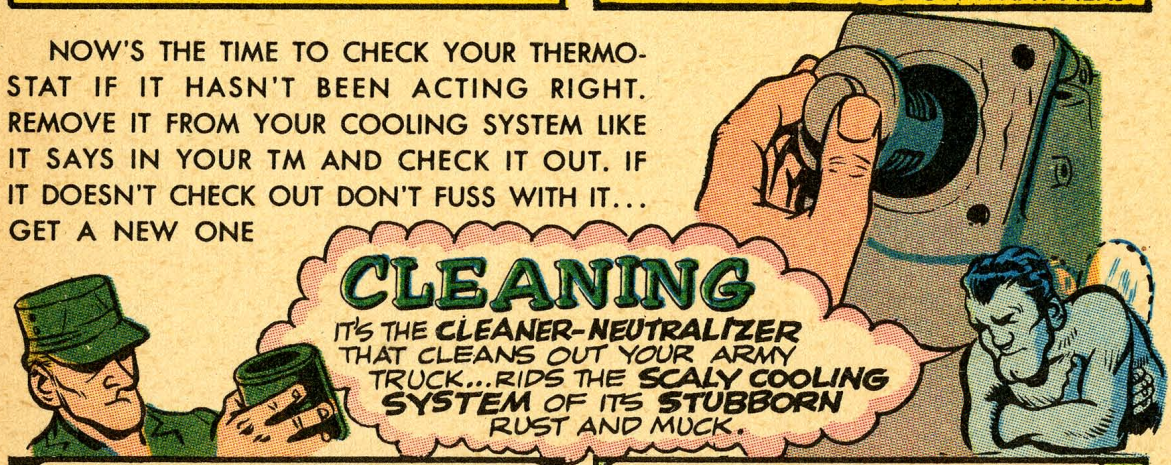


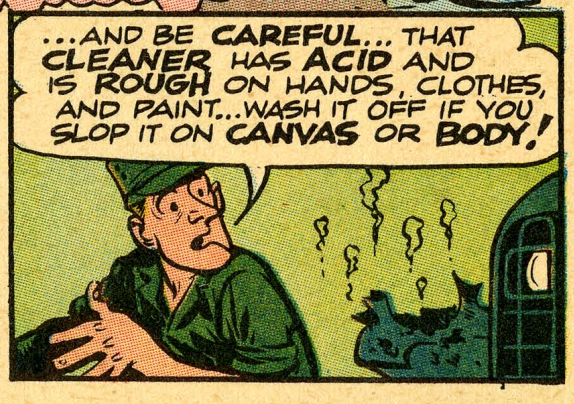
UNSCREW YOUR PRESSURIZED FILLER CAP AND THEN OPEN COCKS, VALVES, AND DRAINS...THE STUFF SHOULD POUR OUT

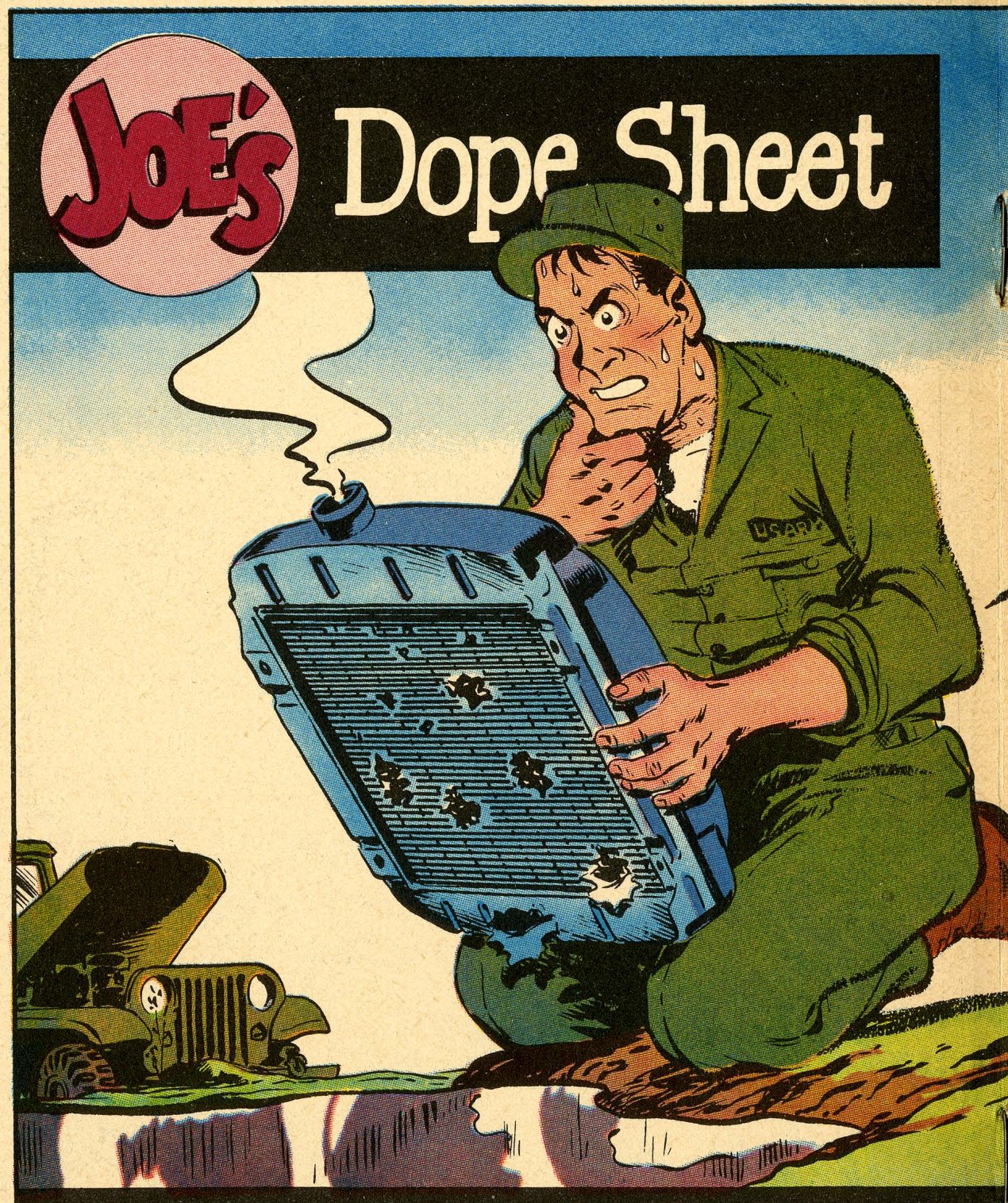
YOU MAY WANT TO SAVE THE ANTI-FREEZE, SO CATCH IT IN CLEAN CONTAINERS FOR FUTURE USE

AND TAG ALL CONTAINERS FOR TESTING AND STORAGE...YOUR LOCAL S.O.P. WILL GUIDE YOU ON WHAT NEXT

NOW'S THE TIME TO CHECK YOUR THERMOSTAT IF IT HASN'T BEEN ACTING RIGHT. REMOVE IT FROM YOUR COOLING SYSTEM LIKE IT SAYS IN YOUR TM AND CHECK IT OUT. IF IT DOESN'T CHECK OUT DON'T FUSS WITH IT... GET A NEW ONE







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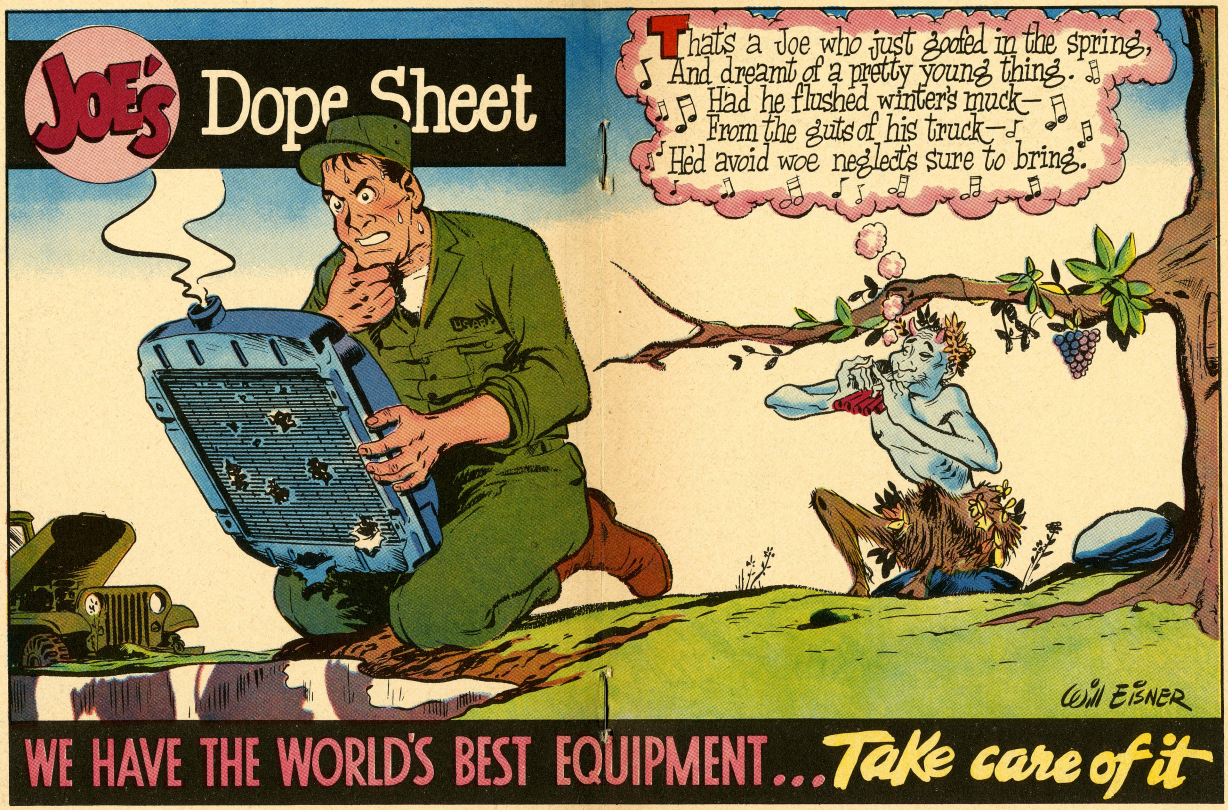

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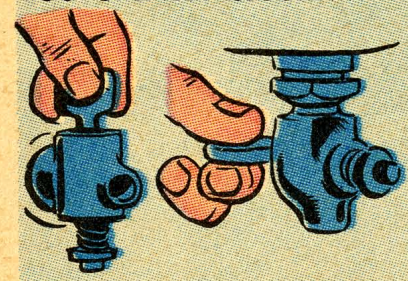
UIPMENT...Take care of it

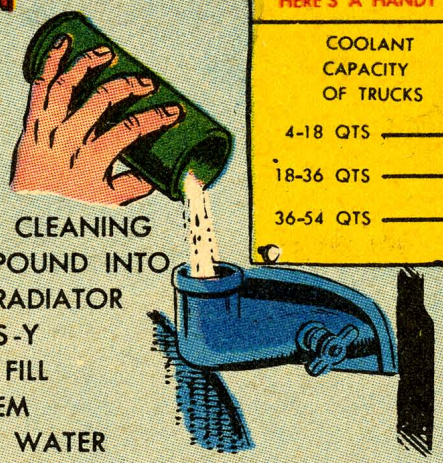
56 BY WILL EISNER

O.K., Let's Go

1 ENGINE COOLED OFF? RADIATOR AND CYLINDER-BLOCK DRAIN COCKS (WHICH YOU OPENED) CLOSED!



POUR CLEANING COMPOUND INTO THE RADIATOR E-A-S-Y AND FILL SYSTEM WITH WATER



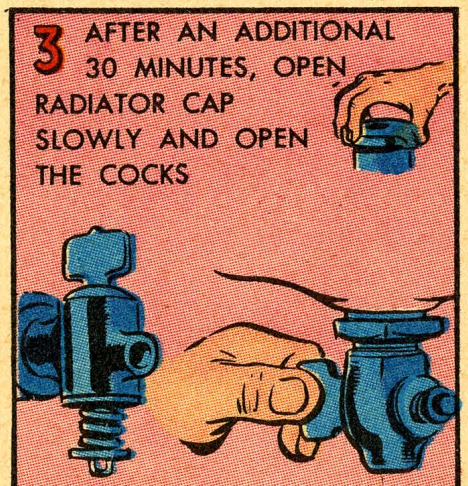
HERE'S A HANDY "HOW-MUCH" GUIDE

COOLANT CAPACITY OF TRUCKS	CLEANING COMPOUND TO USE
4-18 QTS	1 CONTAINER
18-36 QTS	2 CONTAINERS
36-54 QTS	3 CONTAINERS

USE IT ONLY WHEN YOUR TRUCK REALLY NEEDS IT... NOT EVERY TIME YOU CHANGE COOLANT.

2 PUT ON RADIATOR CAP AND RUN ENGINE AT FAST IDLE UNTIL SHE REACHES HER NORMAL OPERATING TEMP... DON'T ALLOW COOLANT TO BOIL

3 AFTER AN ADDITIONAL 30 MINUTES, OPEN RADIATOR CAP SLOWLY AND OPEN THE COCKS

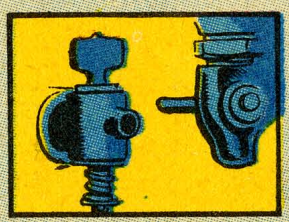


4 CLEAN RADIATOR FILLER CAP WITH SPRAY OF WATER THROUGH HOLES IN VALVE CAGE, WHILE YOU JIGGLE 'ER WITH YOUR FINGER.

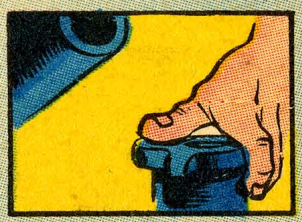
5 CLEAN OUT THE OVERFLOW TUBE

6 CLEAN OUT ANY GLOBS IN THE DRAIN COCKS

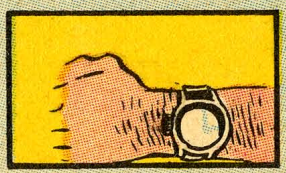
7 NOW FOR THE NEUTRALIZER



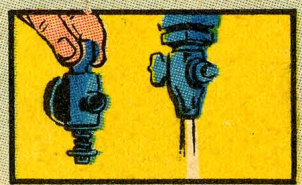
1. CLOSE THE COCKS



2. POUR NEUTRALIZER INTO SYSTEM, FILL HER UP WITH WATER, PUT ON CAP



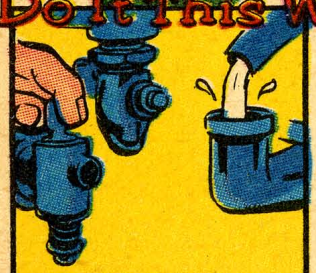
3. RUN ENGINE TILL TEMP IS NORMAL AND THEN 10 MIN MORE



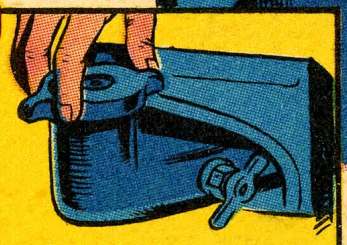
4. DRAIN WITH CAP OFF AND COCKS OPEN

FLUSHING

Do It This Way



1 CLOSE DRAIN COCKS AND FILL SYSTEM WITH FRESH WATER



2 PUT CAP ON...RUN ENGINE AT NORMAL OPERATING TEMP FOR 5 MINUTES

3 CAP OFF...COCKS OPEN. CHECK DRAIN-OFF. IF WATER IS DISCOLORED, DRAIN AND REFILL AGAIN UNTIL IT'S CLEAR

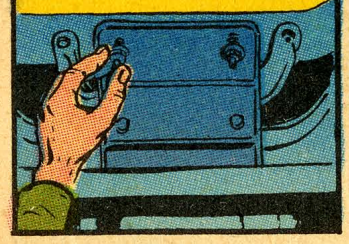
After You've Finished

LIKE IT SAYS

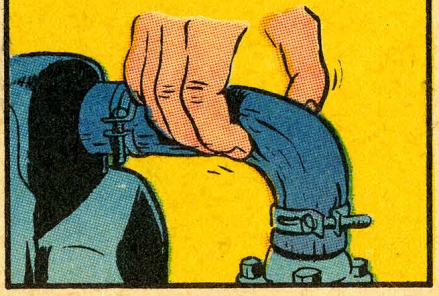
ADD RUST INHIBITOR...WHICH WILL HELP **PREVENT** RUST BUT DOES NOT CLEAN IT OUT...THAT'S WHY YOU DID ALL THAT CLEANING AND FLUSHING

ADDED SERVICES

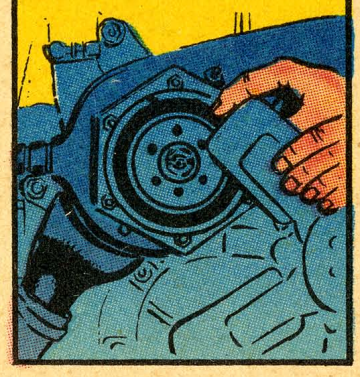
CHECK THE SYSTEM FOR LEAKS ONCE MORE...ALSO CHECK THE RADIATOR MOUNTINGS FOR TIGHTNESS



CHECK THE WATER HOSE BY FEELING IT. CRACKED OR MUSHY? DITCH IT. IT HAS TO BE PLIABLE, BUT FIRM. CHECK CONNECTIONS



HOW'S THE WATER PUMP? WHEN DID YOU LUBE IT LAST?



BLOW OUT THE RADIATOR, BUT DON'T USE STEAM!!
NATURALLY IF THERE ARE ANY RADIATOR LEAKS YOU CAN'T FIX...TELL ORDNANCE!
I ADMIT THIS MAY BE A BIT UNORTHODOX, SARGE... BUT AS A RESULT WE GOT THE BEST MAINTENANCE RECORD IN THE WHOLE DANG DIVISION!
I TELL YA I SAW I HIM WITH MY OWN EYES...THEN HE VANISHED INTO THIN AIR...???

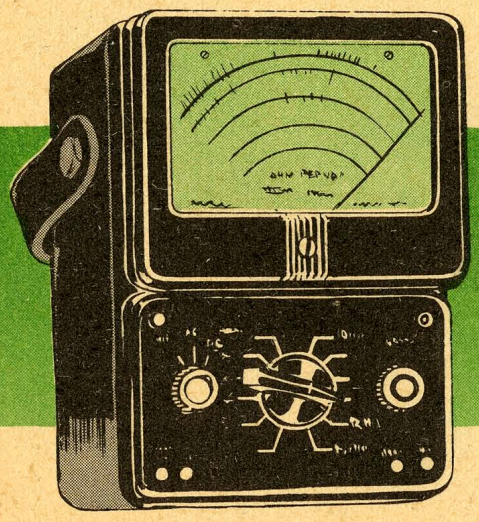
Your new meter's ready

A new super-duper tool has been added to your second echelon supplemental tool sets that's going to make working with that 24-volt electrical system a heckuva lot easier. It's known as the volt-ohm-meter (Ord Stock No. 17-V-808).

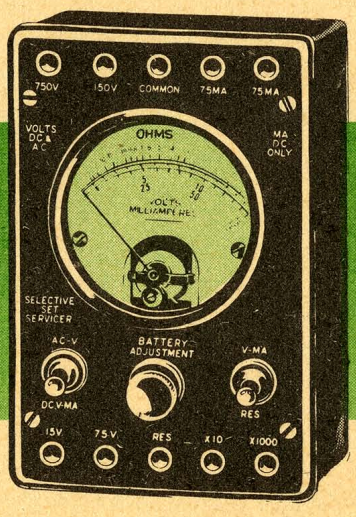
This meter is a small, compact job that'll check out any and all resistance for you in those electrical lines.

The meter has been authorized for inclusion in Tool Set, Organizational Maintenance (Second Echelon), Set No. 1, Supplemental (Ord Stock No. 41-T-3538-865); and in Tool Set, Organizational Maintenance (Second Echelon), Set No. 2, Supplemental (Ord Stock No. 41-T-3538-870). The authorization came from Change Notices ORDWD-TEK-CA-13218 (30 Sept 55) and ORDWD-TEK-CA-14033 (16 Aug 55).

Why not hop down to the supply room and see if your meter's waiting for you?



YOU'LL GET ONE OR THE OTHER—THEY BOTH DO THE SAME JOB.



Duku skippers

Sea-going truck drivers are in for some pleasant reading in TM 55-505 (Jan 55), the new handbook for drivers of the 2½-ton 6x6, amphibious truck.

The pocket-size book covers the DUKW's driving habits and its preventive maintenance needs from stem to stern. And it goes into other things all good DUKW skippers must know . . . like the semaphore (hand flags) alphabet, knot tying tricks and the International Morse Code—plus a sprinkling of sea-going lingo.

Commercial-type publications

If you've been asking for dope on how to get manuals for your commercial-type vehicles, well here 'tis.

Write to Chief of Ordnance, Department of the Army, Washington 25, D. C., ATTN: ORDFM-Pub, and if your justification's good enough, they'll OK your request (See AR 310-90 para 1).

Here's something to remember—if you do only 1st and 2nd echelon maintenance, then you won't get a shop manual. And the shops won't get a driver's manual.

Now if it's for power tools that you're lacking a manual, write to the same address. Be sure you include the info given on the data plate when you request a manual.

Risky switchin'

That's right—although the mounting will let you switch those carburetors between your G742 and G749 2½-ton trucks, it's a risky thing to do.

It's possible for you to make that switch but funny things can start happening to your truck. Your vehicle's efficiency will be cut and instead of putting out with good performance it may start bugging on you, all because the fuel-air ratios of the carburetors are different.

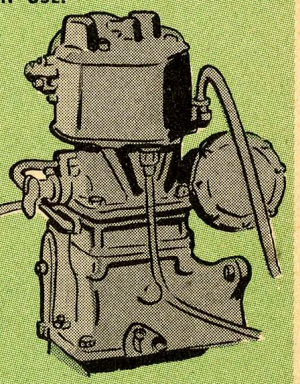
So, if you need a new carburetor, order the one that belongs on your truck.

FOR THE **G742** YOU CAN USE:

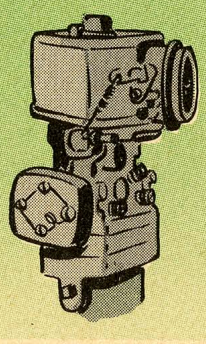
CARBURETOR ASSEMBLY
G742-7368643

OR

CARBURETOR ASSEMBLY
G742-73648717

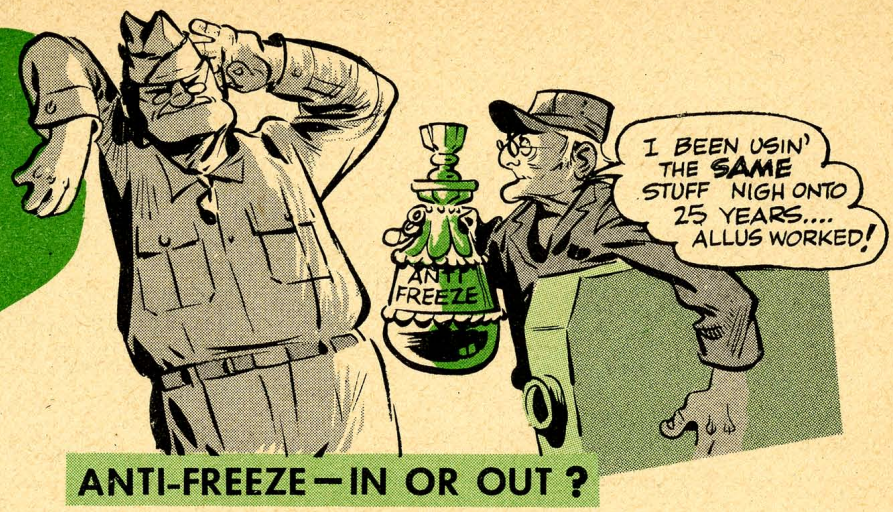


FOR THE **G749** USE:



CARBURETOR ASSEMBLY
G749-7411781

SGT HALF-MAST McCANICK'S ANSWER DEPT.



ANTI-FREEZE—IN OR OUT?

Dear Half-Mast,

How come all this foolishness about taking out our anti-freeze in the summer, storing it and replacing it next winter? My experience with my own car is that if I leave well enough alone I can go on nicely from year to year on the same anti-freeze.

My car is now four years old, I've had her ever since she was new, and I'm still using the same anti-freeze I put in the first winter. Of course, I cleaned the radiator before I put that anti-freeze in, and I have kept plenty of rust inhibitor in the solution ever since. Fact is, I also have a coolant filter on my car. But with this, I have never had any trouble with my cooling system.

I add water to the radiator in the summer to make up for evaporation losses, and just before cold weather, I check the specific gravity of the solution and add enough anti-freeze to correct it to −20 degrees.

It seems to me this is a heck of a lot simpler than trying to drain and save anti-freeze. Why doesn't the Army do the same thing?

Sgt P. E. E.

Dear Sgt P. E. E.,

About this anti-freeze problem of yours. Seems to me you've been lucky to get away with your program. Of course, having that coolant filter, and keeping plenty of rust inhibitor in your radiator no doubt helped. But on top of that, you must've been mostly in a fairly mineral-free water area, and have never had to use any dirty water in your radiator, like from a water hole or muddy creek.

The Army isn't always that lucky, and so they have to figure on giving their radiators a good cleaning twice a year, just before adding anti-freeze and again after it's removed (See Change 1 to TM 9-2858).

Another thing, your head gaskets must have been real good and tight all the four years you've had your car, or you'd have had some coagulation of your anti-freeze when the combustion gases got into it. But mebby that filter stopped what little you did get.

I'm in the other school of thought myself. I have dumped my anti-freeze on the ground every spring and given my radiator a good flush, refilling with

plain water for the summer. Then I clean the radiator again and put in a new charge of glycol for the winter. Costs me a few bucks, but I have had no trouble.

The Army has so darned many vehicles that they can hardly afford to throw out all the anti-freeze they need, and besides, I doubt we'd find enough glycol for civilian use if the Army was filling every radiator with new stuff every year. So until somebody changes his mind, I'm afraid you'll have to go on saving and storing your coolant each spring.

Half-Mast

FORDING KIT BREAKDOWN

Dear Half-Mast,

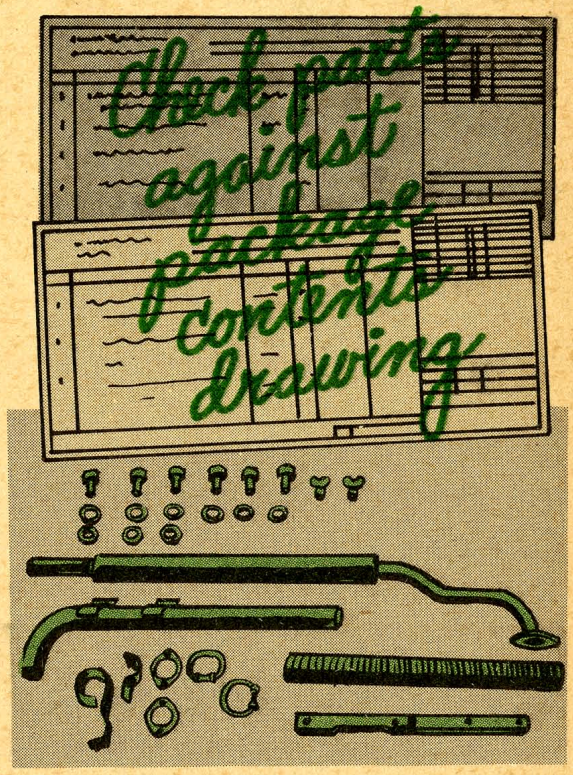
We got a couple of deep-water fording kits lying 'round here in unserviceable condition. What do we do 'bout ordering parts for these kits?

Sgt C. R. W.

Dear Sgt C. R. W.,

When these deep-water fording kits are issued, there should be a package content print with each kit. On these prints, some of the parts are listed without Ordnance stock numbers. These're the parts you can't order from supply. In other words, if any part is damaged or missing, you've got to reorder the whole kit. The parts without Ordnance stock numbers are parts which are used only for the deep-water fording kits.

On the other hand, if you're missing or got a damaged part which has an Ordnance stock number, you can reorder the part without reordering the whole kit. The parts with stock numbers are used for other purposes besides the kits.



Let's say you check the package content print against your unserviceable fording kit. If you find a damaged part or there's a part missing, and if this part has no Ordnance stock number pack up the kit and return it to supply with a DA Form 447 (Turn-In Slip).

If the kit just came from the factory, do the same thing, but instead of a DA Form 447, use a DD Form 6 (Report of Damage or Improper Shipment). In case you haven't got a package content print, return the whole kit to supply with a DA Form 447.

Half-Mast

COVER STORY

Dear Half-Mast,

Can you give me the correct nomenclature and TM (if any) on the M48 tank tarpaulin? Also what portion of the tank the tarp is supposed to protect?

Capt D. B. P.

Dear Capt D. B. P.,

Sure can. You'll find it listed in the OVM section of the latest M48 supply manual (Ord 7 SNL G-254, Jan 55), on page 9 under Tools and Equipment: Cover, canvas, 12 x 12 ft, Ord Stock No.G258-6537589.

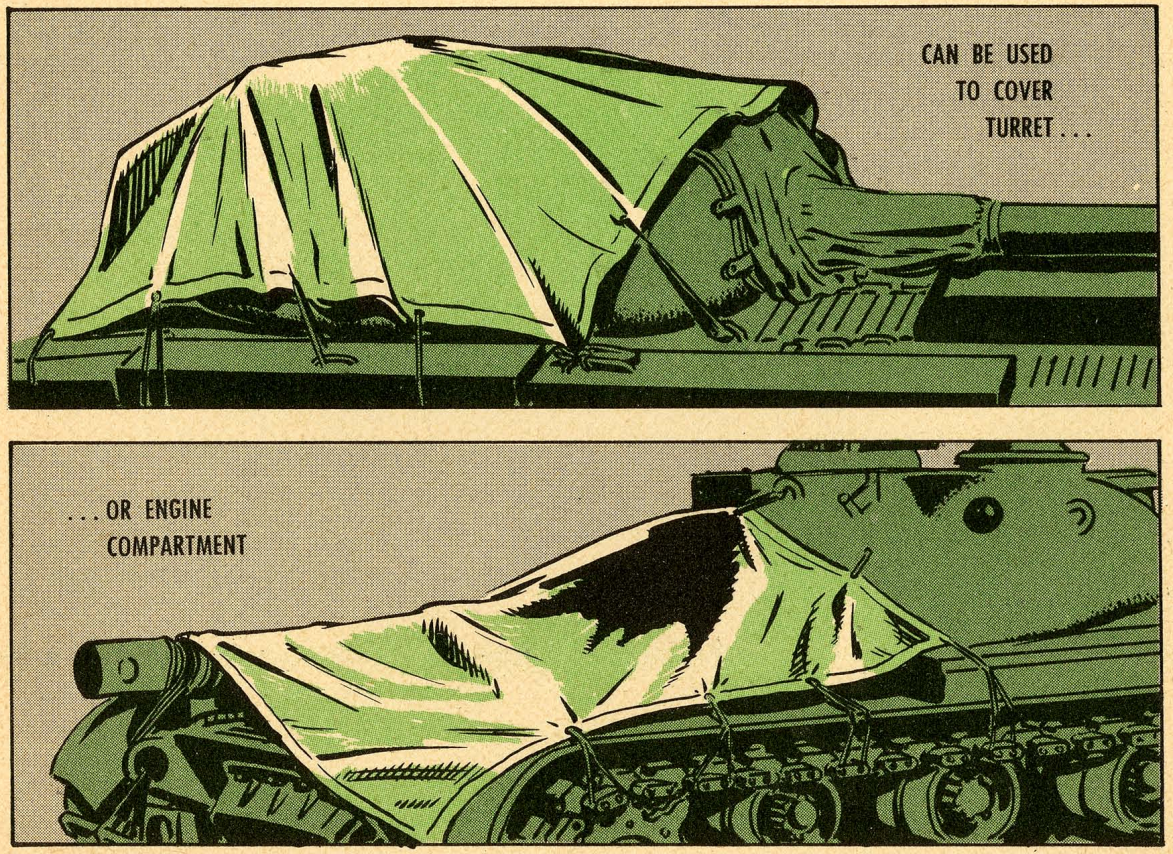
'Fraid you won't find the use of this cover covered in a TM, though. Or in any other directive at present.

But—the paulin's chief purpose is to cover the turret when the tank is parked. As y'know, some turrets tend to leak a little when it rains. And they contain a lot of delicate instruments which are not helped a bit by water.

So, use the tarp to cover the turret. And whatever's left over can be stretched to give the engine compartment as much shelter as possible.

'Course the cover can be used for a lot of other things. Like for making sun shelter in a dry area, laying out tools and equipment, camouflage, etc. (Have even heard of 'em being used to help shelter a crew.) But—its main purpose is to keep that turret dry as a doodlebug's hole.

Half-Mast

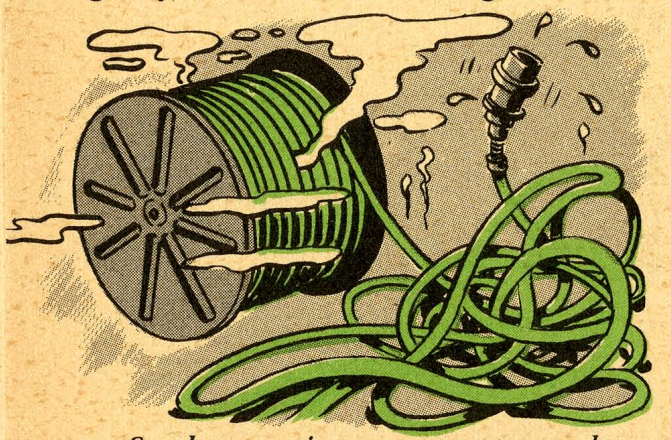


A Reel Hot One

Dear Half-Mast,

Here's a problem that's been causing some rather heated arguments around these parts.

Cable used in the guided missile (and fire control) systems comes on metal reels in various lengths. But in an installation you find that one cable unit or a combination of units won't always give you the exact cable length needed.



So the question comes up as to how to handle the extra cable when there's more on the reel than you need in the circuit.

Some say leave the excess rolled on the reel—they say that this is not only convenient but causes no adverse effects to the circuits. Others say take it off the reel—that inductive action in the reeled cable will generate a lot of heat and that counter emf (electromotive force) will cause a greater line loss in the cable run.

What do you say?

Mr. V. D. C.

Dear Mr. V. D. C.,

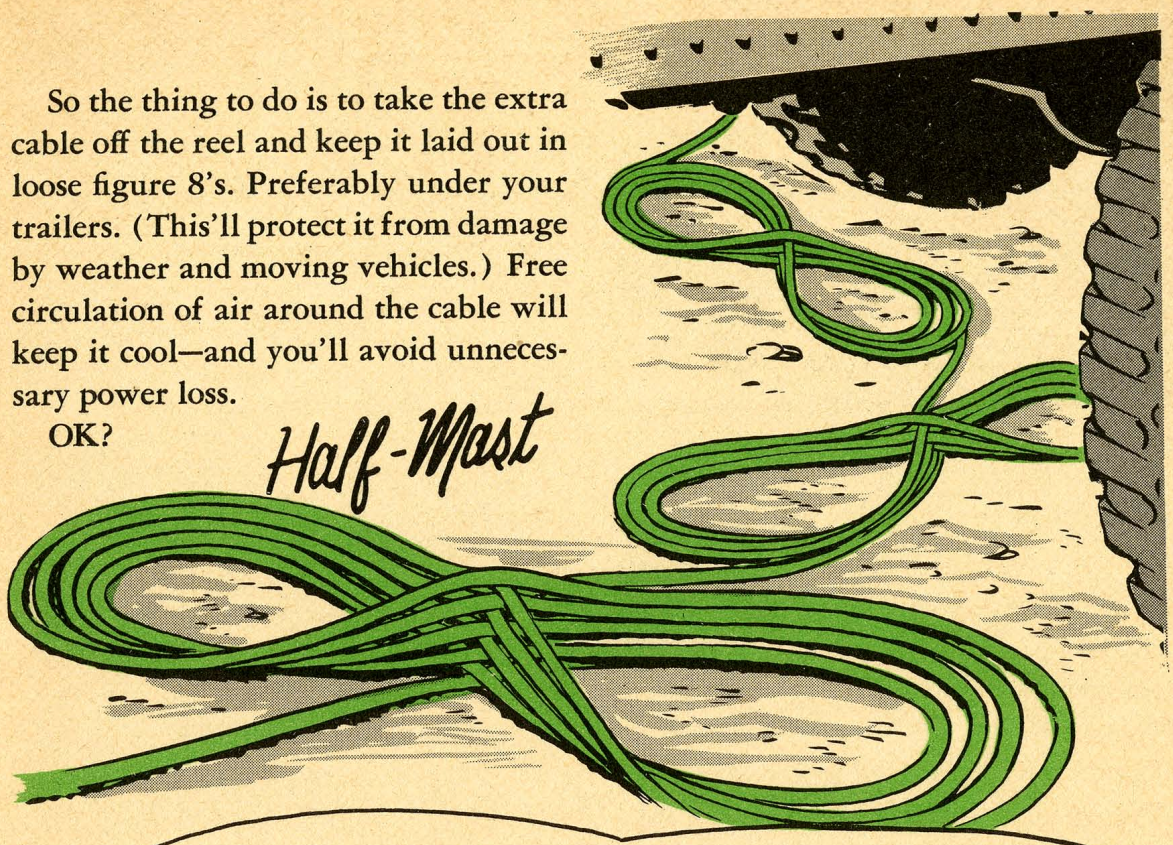
I say you'd get a real hot reel, all right, by leaving that extra cable on it. But it wouldn't be from the added inductance. It's just that the heat that comes from normal power loss (I^2R) in the cable would be **concentrated** in the reel, and ventilation around the coils'd be so restricted that the temperature would shoot up. This concentrated heat not only adds resistance to the line, it can damage the cable.

Though the inductance of a coiled cable doesn't produce heat, it will cause a slightly bigger voltage drop across the coil in alternating-current circuits. And in coaxial cables carrying high frequency circuits, the coil could cause standing waves — and lower your power transfer.

So the thing to do is to take the extra cable off the reel and keep it laid out in loose figure 8's. Preferably under your trailers. (This'll protect it from damage by weather and moving vehicles.) Free circulation of air around the cable will keep it cool—and you'll avoid unnecessary power loss.

OK?

Half-Mast



Replacing Nike's AGC Chassis ? READ THIS...

Before you install a new automatic gain control chassis in the Nike's range and receiver cabinet make sure its sum-zero potentiometer is turned fully clockwise... and please always take time to turn off the plate volts.

Anytime you overlook these small details when replacing this chassis you'll burn the resistors in the main IF amplifier as soon as the chassis makes contact.

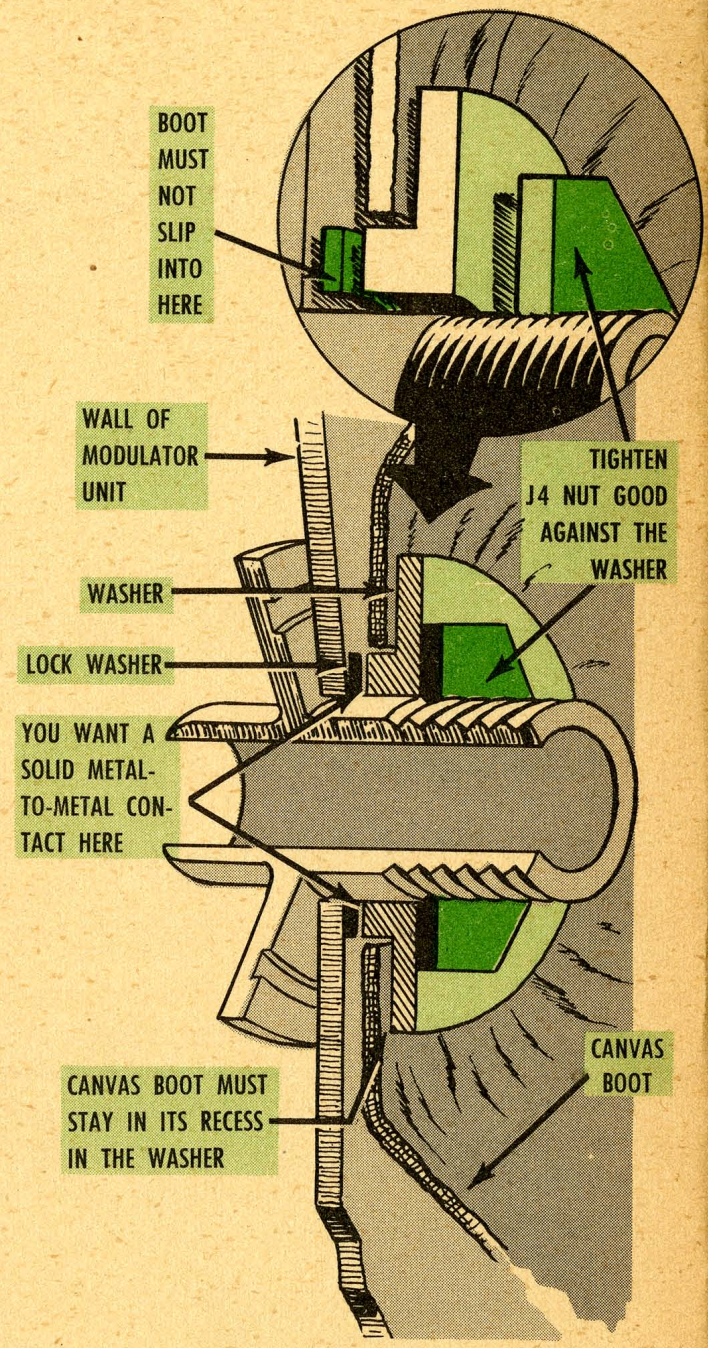
Loose Jack Nut

The nut holding J4 (the high voltage pulse output jack) on the Nike's and the M33's acquisition radar modulator, has a way of working itself loose which causes arcing around the jack. Normally the arcing isn't visible cause it goes on inside the modulator, but you can hear its loud whir. Something else that'll clue you to a loose J4 nut is erratic magnetron current readings.

If you don't spot the loose nut and stop the arcing, you'll soon have power output loss, and before too long you'll be left with a burned jack, which'll put you out of business.

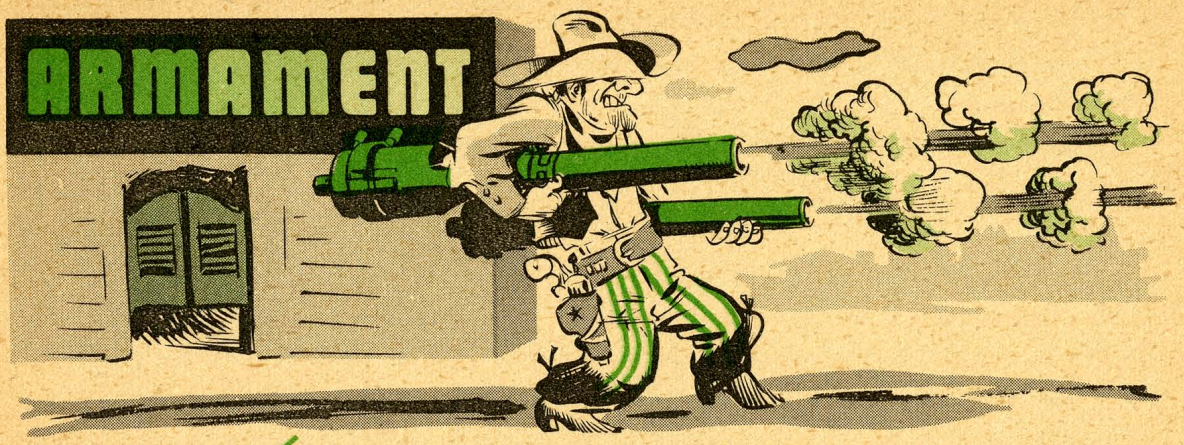
So keep that nut tight and you'll avoid trouble and jack replacements. Put a socket wrench to it now, and then check it at least monthly. When you're tightening make sure there's good electrical and mechanical contact with the modulator. The jack's canvas boot must sit only in its recess in the nut's washer so's not to interfere with metal-to-metal contact. After you tighten the nut, work the boot gently away from the nut to make sure it's not clamped. It's also a good idea to check new units to make sure the boot isn't caught under.

Should you find that arcing continues after you've tightened the nut and made sure the boot is free all around the nut ... don't fool with it any further ... it's time for Ordnance to take over the arcing problem.



FOR GOOD METAL-TO-METAL CONTACT J4 NUT MUST BE TIGHT AND BOOT MUST NOT BE CLAMPED BY NUT. BOOT SHOULD MOVE FREELY AROUND NUT WHEN PUSHED OR PULLED GENTLY.

ARMAMENT



SHOOTING TOO FAST?

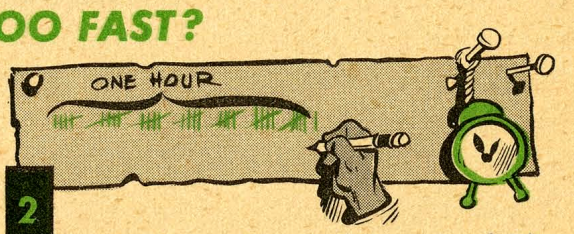
Firing your 106-mm recoilless rifle like a machine gun is pushing her beyond her safety limits.

Whether you're shooting real fast for a short time, or fast as you can for an hour, or for as long as you can by giving the piece a rest now and then, you've got a limit to keep in mind.

The thing's kinda like a formula. The heat of the tube is related to its thickness according to how often you shoot. In other words, the 106 can heat up over 500 degrees F during too long a period of sustained firing, which is too hot for the chamber and barrel to meet safety standards.

To play it safe and make your piece last a long time, remember these rules and you'll be around to shoot another day.

1 You can fire 11 rounds fast as you can load 'em providing the rifle is not over 125 degrees F or has just had a 15-minute cooling period.



2 Maximum Rate of Sustained Fire — Don't shoot more than 36 rounds per hour.

3 Prolonged Irregular Fire—After a maximum short burst, don't fire more than 36 rounds in the next hour. A 15-minute cool-off is needed between two maximum short bursts. Let her cool for 15 minutes after sustained fire before firing a maximum short burst.

BLANK PROBLEM

Dear Half-Mast,

What do I do now? The short-round stops on 1919A1, A4 and A6 30-cal machine guns fit on the cartridge alinement pins. Now comes MWO A6 W14, Ch 2 and MWO A5 W16, Ch 1 to tell us to stake it on.

OK, we stake it. Now, how in the blue-eyed world do we get the darned

thing off for blank firing problems? This is normally a job for the unit, but since breaking off a few alinement pins, we send our guns to Ordnance for this change. Which is a stinker when you get your orders at 1600 to fire a problem next day at 0800.

We have heard it said that we're supposed to reserve a few guns for blank fire use and not apply this MWO to those guns. Is this correct? And if so, is it covered by any directive, or reflected in a change to the TOE? We can't decline to fire our serviceable machine guns on problems unless we have an authority to quote, and we don't want to be gigged for unmodified guns unless we're covered there, too. Can you help us?

Sgt L. M. G.

Dear Sgt L. M. G.,

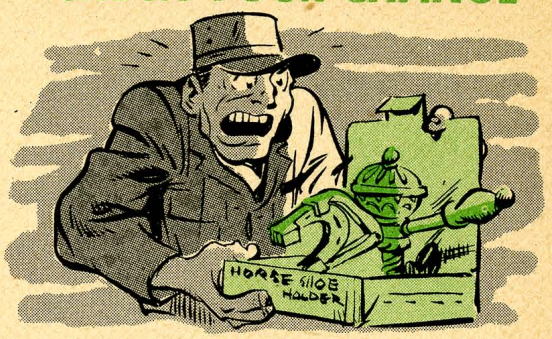
Sure can. There's a new cartridge-stop attachment out for the guns which can be installed without removing the short-round stop. The word went out in a circular letter (13 Apr 55) from Rock Island Arsenal to all Army areas. The new gadget is now available from supply.

So, you turn in your Attachment, blank firing, Ord Stock No. A006-5545973, and requisition Attachment, blank firing, M6, Ord Stock No. A006-8412139.

See? No problem.

Half-Mast

CHECK YOUR CHANGE



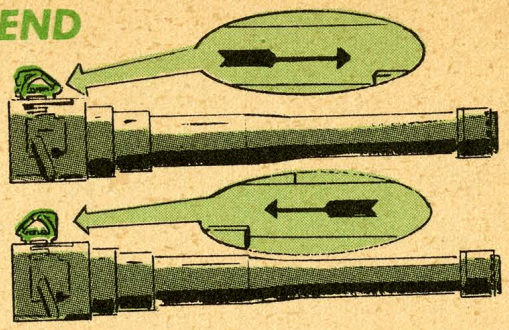
When ordering special tools for your M44 self-propelled howitzer make sure you check all the changes to your supply manual. Hear some people've been overlooking the changes—and getting the wrong tools. Such as medium-tank wheel lifters and end-connected-track jacks—which're about as useful on your M44 as bells on a bunk.

Your Ord 7 SNL G-279 should be complete with Changes No. 1 (30 Aug 54). This contains the poop you need—except that the following listed items are now obsolete and/or have been removed from Special Tool Set, B, 41-T-3569-99; also from Sets 41-T-3582-903, 41-T-3583-903, and 41-T-3584-903. And who'd want to try to make out with an obsolete tool?

Obsolete Item	Ord Stock Number
REMOVER	41-R-2367-600
REMOVER	41-R-2372-740
REMOVER	41-R-2382-820
REMOVER	41-T-2382-822
REMOVER	41-R-2382-824
REMOVER AND REPLACER	41-R-2374-145
REMOVER AND REPLACER	41-R-2374-803
REPLACER	41-R-2383-85
REPLACER	41-R-2398-735
WRENCH*	41-W-3245-120

*Still used in some tool sets (not completely obsolete).

END-FOR-END

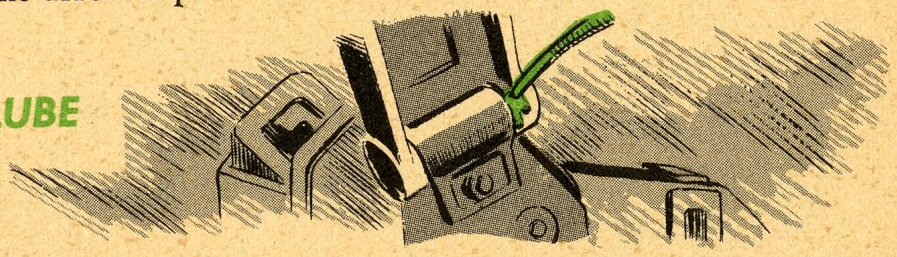


When you want to be sure that the quadrant you're using with your artillery pieces is on the level, better give it the end-for-end test.

It's easy: Set the quadrant at zero elevation, using the black numbers on the M1. Place the quadrant on the leveling blocks with the "Line of Fire" arrow pointing forward and center the quadrant bubble by elevating or depressing the gun tube. Then give the quadrant an about face so the arrow'll point in the opposite direction.

If your quadrant's OK, the bubble still ends up centered. If it's off more than four-tenths of a mil either way (± 0.4), then it should be turned in to Ordnance. Let them do the adjusting.

A LITTLE LUBE



Many AAA crews are having trouble swiveling the gun clamp on the rear outrigger of the 90-mm M2 mounts to different positions. Daily lubrication will correct that.

The clamp won't swivel because pin A240088 is locking or freezing to bracket C97987, killing the hinge action. Lube the hinged assembly every day and the clamp will swivel easy.

A little daily lubing goes a long way.

MAKE YOUR LATEX LAST

Oil and grease are to blame if the white latex headrest and eyeguard coverings on your tank sighting equipment are crumbling.

Try and keep hands and face clean free of grease and oil when in contact with the headrest, and tell the barber to go easy on the hair goo. It'll help conserve the rubber.

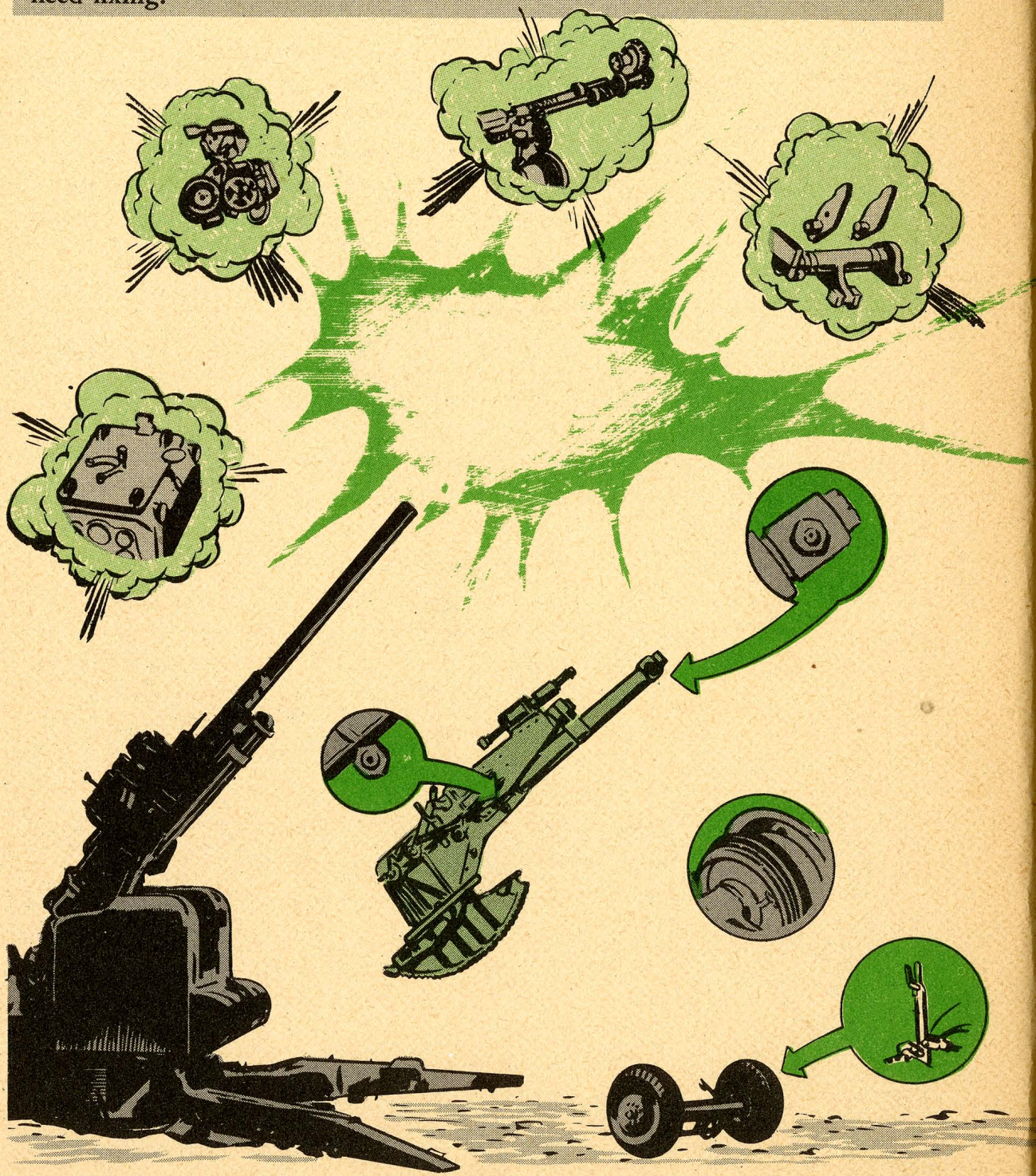
Real cold or hot weather is also rough on that latex. The boys in the lab got a clue on all that and are designing synthetic rubber coverings which are tougher.

Meanwhile, keep grease and oil away from those coverings.

LOOK OUT FOR THAT

Your 90-mm M2 needs a look-see now and then in addition to regular inspections to keep her going strong.

Check your piece against this chart for any possible trouble spots that may need fixing.



LOOK OUT FOR THAT 90MM

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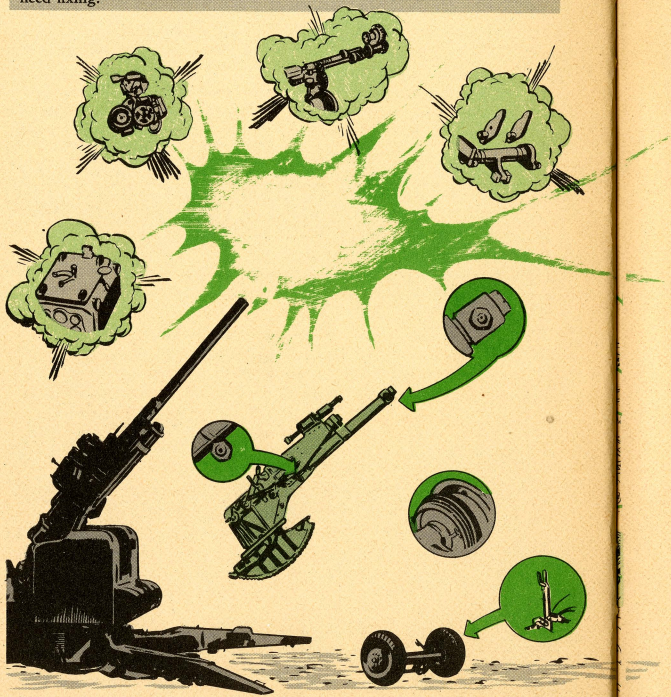


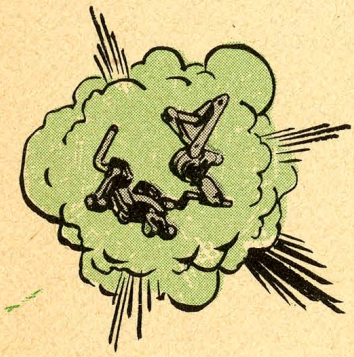
- ☑ **RECOIL MECHANISM**—Check nitrogen pressure for leakage with soap suds. (Check TB Ord 605 for proper recoil oil reserve.)
- ☑ **GAS AND OIL FILLING VALVES**—Improperly seated.
- ☑ **COUNTER-RECOIL BUFFER**—Rod not following gun out of battery, gun not slamming into battery.
- ☑ **RECOIL LENGTHS**—Check at 0 and 80 degrees.
- ☑ **ELEVATION LIMIT STOPS**—Gun not stopping at full limit.
- ☑ **GUN BORE AND CHAMBER**—Rust, corrosion, fouling.
- ☑ **OUTRIGGERS**—Rusted joints and surfaces.
- ☑ **HYDRAULIC JACKS**—(Extend ram and oil ram and wiper weekly.)
- ☑ **ELECTRIC BRAKE**—Loose, broken connections or wires, dirty sockets, plugs, drum and magnet facings.
- ☑ **HAND BRAKE**—Bad adjustment.
- ☑ **MOTOR BELT**—Frayed, smeared with oil or grease.
- ☑ **TRANSMISSION**—(Check operation by moving flywheel counterclockwise manually while gun is out of battery.)
- ☑ **RAMMING ROLL MECHANISM**—(Check by turning drive shaft manually.)
- ☑ **FUZE SETTER BY-PASS CLUTCH**—Faulty latching action.
- ☑ **RAMMING ROLLS**—Smeared with oil and grease, roll gearing overlubricated.
- ☑ **BREECH MECHANISM**—Action rough, not positive.
- ☑ **FIRING MECHANISM**—Wear between sear and firing pin guide lug, loose breechlock bushing, weak springs.
- ☑ **FUZE SETTER MECHANISM**—Not oriented or synchronized.
- ☑ **HAND FUZE SETTER**—Not oriented or synchronized.
- ☑ **TIRES**—Variation from 65 PSI, dirty with grease or oil.

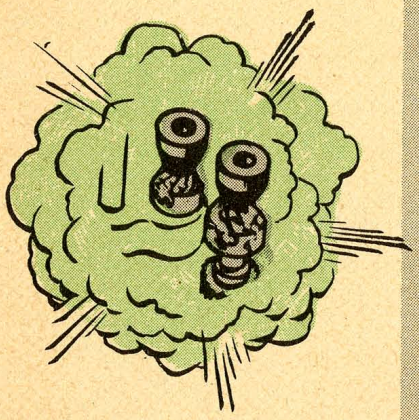
While You're At It...

...There are other checks to keep your preventive maintenance up to par. Clean painted metal surfaces with a dry cloth and unpainted surfaces with an oily cloth...plugs and receptacles should be clean and covered...cables free of grease and oil...check tubes and connections for leaks...see that oil housings are screwed on tightly and that seals are OK...look over all external electrical connections for grounds and breaks...all soldered joints should be covered with glyptal lacquer.

Run a careful hand and eye over the gun and assembly with a lookout for general smoothness of operation...elevate and depress the mount by hand between upper and lower stops...traverse it 6400 mils to check freedom of movement and report undue binding or backlash to Ordnance.

90MM





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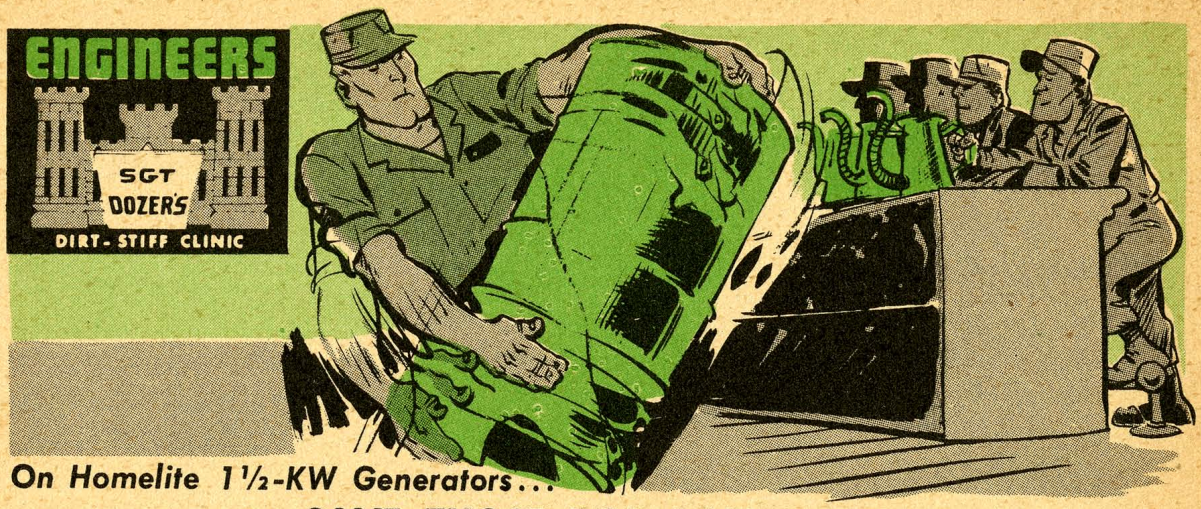


On Homelite 1½-KW Generators...

SAVE THOSE ROD BEARINGS

Dear Sgt Dozer,

How does a rod bearing get lubed on a 2-cycle gas engine on Homelite 1½-KW generators?

MSgt L. F. E.

Dear Sergeant L. F. E.,

Sure glad you asked that question, because we really came a cropper on burned out connecting rods on the 1½-KW Homelite generators during a recent maneuver. It was a doggone shame, too. All that was needed was a little preventive maintenance.

The lube orders and tech manuals for all models of the 1½-KW Homelite generators tell you to add a small amount of oil with the gasoline every time you fill the tank. That little bit of oil in the gasoline lubes those rod bearings and keeps the engine running like a hopped-up nag in a claiming race.

When you let your generator engine go without oil, you can bloody well expect trouble. Take a look at LO's 5-5034 and 5-5036 on the Homelite models HRUA and HRA. They tell you to mix ½ pint of NS 3100 lubricating oil with each gallon of gasoline every time you fill the tank.

Be sure and do the mixing in a separate container. Shake until the oil and gas are mixed and then pour the mixture into the gas tank. If NS 3100 isn't available, you can use OE 30.

The amount of oil you add to the fuel will vary with the different engines, so be sure and check your lube order closely. On the Homelite Model 24 AD 120-23, you add ¾ pint of oil to each gallon of gasoline. You'll find this dope in LO 5-5382. Some generators have a measuring cup built in as part of the gas tank cap. Use it to measure the oil.

Yep, you ought to keep those LO's with every piece of Engineer equipment. By using 'em, you'll be lubing by the book.

Sgt Dozer

Careful What Kind Of Send-Off You Give Road Builders...

NOBODY LIKES TO RECEIVE CRUMPLED EQUIPMENT

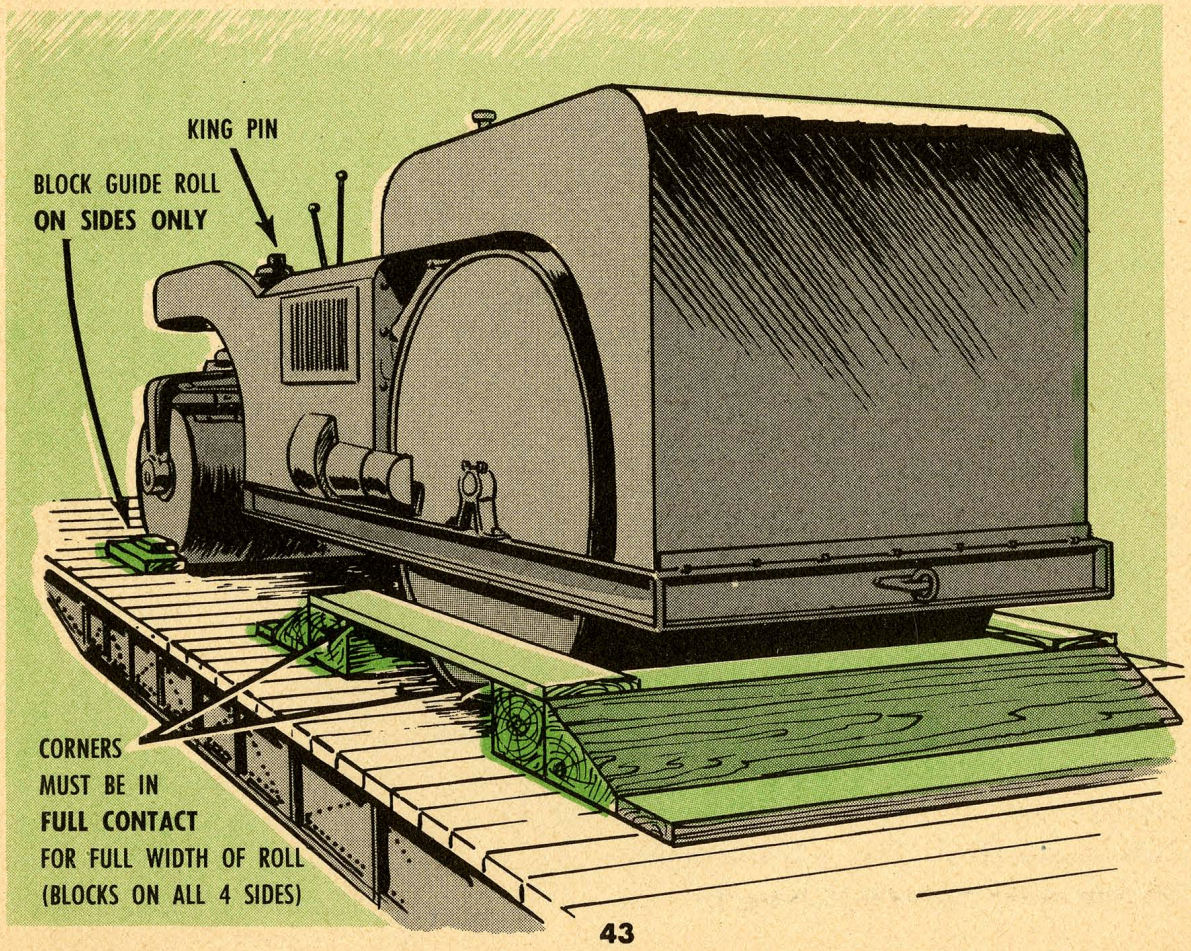
When you're preparing tandem-type road rollers for shipment—like Buffalo-Springfield Models KT-16 and KX-16—remember that the **drive rolls** get blocked and secured on all four sides, and that the blocks you use fore and aft **must** run the length of the roll.

But, when it comes to blocking the **guide-rolls** you secure only two sides. Guide-rolls take **no** timbers fore and aft —only on the sides. And a fast glance will tell you why—and where—it hurts if this type road builder is shipped with its guide-roll wedged tight.

With the guide-roll rigidly anchored the roller's kingpin will get busted with the first hefty jolt the equipment gets in transit.

If you want to be sure all the equipment you ship gets a fair and square send-off, take time to study Pamphlet MD-7, which is published by the Association of American Railroads. Get it at your post transportation office. It's all on loading Department of Defense materiel on flat cars, and pages 181-182, figures 61 and 62 give detailed instructions on blocking tandem-type road rollers.

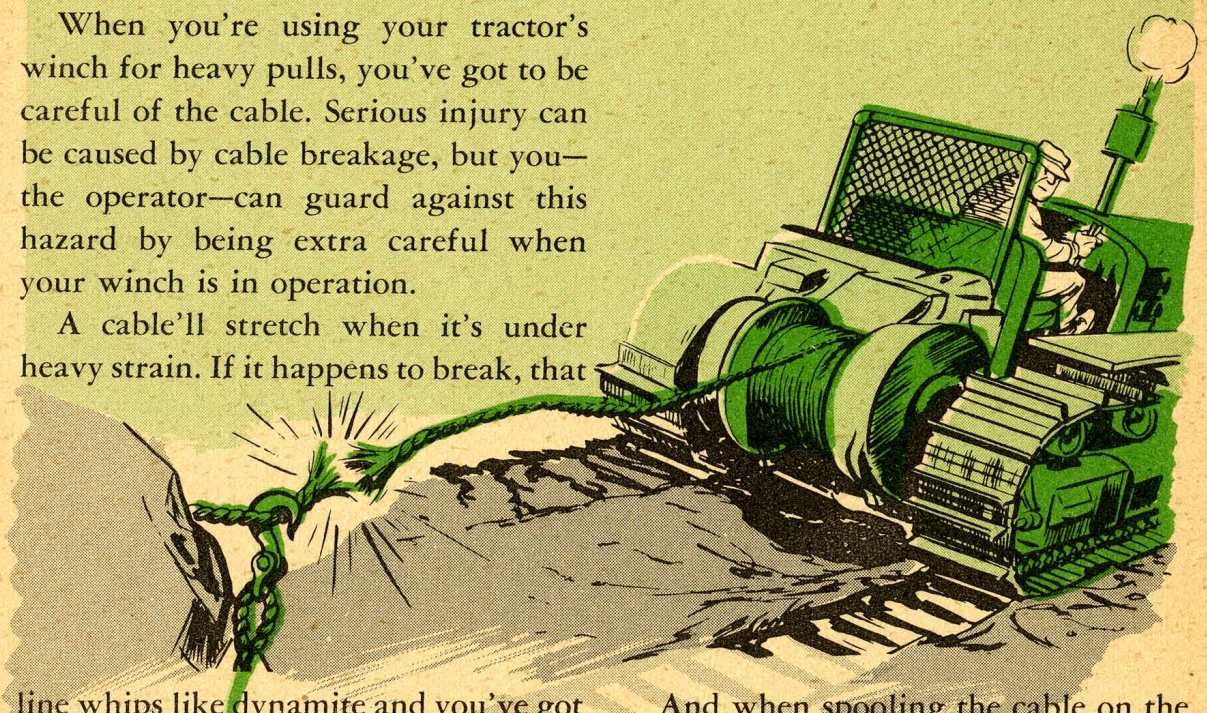
The guy at the other end will love you like a brother if you do all you can to make sure his machines arrive in working order.



WINCH CABLE TIPS

When you're using your tractor's winch for heavy pulls, you've got to be careful of the cable. Serious injury can be caused by cable breakage, but you—the operator—can guard against this hazard by being extra careful when your winch is in operation.

A cable'll stretch when it's under heavy strain. If it happens to break, that line whips like dynamite and you've got to look out.



The greatest danger to the operator comes if the break's near him. Some drivers who play it safe all the way have constructed guard screens and placed 'em right behind the tractor seat. They figure the screen can stand the force of a cable lash better than their head.

For trouble-free winch operation, make sure the cable is in good condition and of good quality. Also, look it over often for weak spots. Although careful operation'll prevent it, cables sometimes get bent sharply, pressed against a sharp edge, or dragged on rough surfaces. This'll weaken 'em and make 'em break easier.

To keep your cable feeling hale and hearty, unroll it every now and then and wipe it clean of mud and sand. Then put some heavy oil on it—providing the cable doesn't have a hemp center.

And when spooling the cable on the drum, take care to wind it straight and tight or you'll have loose and uneven layers. This could lead to real bad cable damage when you want to winch.

You'll be way ahead if you work a winch at less than its maximum capacity. Your cables and winch parts and you will enjoy long lives if you only put moderate loads on 'em. For heavy work, you can reduce the strain by using pulleys.

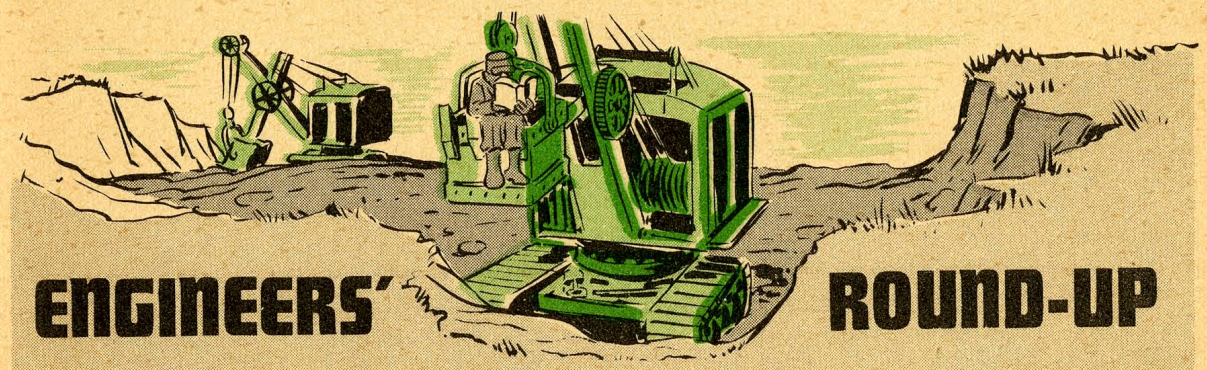
And here's something else to remember: Handling cables sometimes leads to cut hands and torn clothes. A pair of leather-palmed gloves can save a lot of wear and tear on your mitts as well as make cable handling easier.

EVERYBODY'S BUSINESS IS NOBODY'S BUSINESS

When it comes to maintaining the little engine-powered tools and equipment around an Engineer unit, you hafta have somebody responsible for the care of power saws, air compressors, small pumps and so on.

Even though these items are not vehicles, they should be kept on a PM roster. What's more, they should be dispatched on a DD Form 110 or other operational record to show just who had 'em out when.

This pinpoints the responsibility for looking after the engine and other parts, and can prevent you getting gigged for somebody else's goof if you all of a sudden find a burned up engine when you go to draw your equipment.



ENGINEERS' ROUND-UP

Here are some more pubs you can add to your pile:

TECHNICAL MANUALS

5-5382 Gen set, elec, port, 1½KW, Homelite Mod 24AD120-23, 17 Oct 55

TECHNICAL BULLETINS

5-1054-2 PMS, crushing & screening plant, Univ. Eng Corp Mod 1830 CWL, 3 Nov 55

5-9125-1 PMS, shop equip, mtrzd, Set #2, Couse Mod MEDL, 3 Nov 55

5-5337-1 PMS, Gen set, elec, port, 25KW, I-H Mod UD-9, 15 Nov 55

LUBRICATION ORDERS

5-2123 Pump, horiz, 25 GPM, 2-in dis & suction, American Marsh Mod, 16 Nov 55

5-9141 Auger, earth, skid-mtd, gas-drvn, Sterling Eng Mod G1, 4 Nov 55

ENG 7 & 8's

1097 Roller, road, gas-drvn, tandem, 2 axle, Galion Mod T5RW, 17 Oct 55

9517 Crane-shovel, PU, rev, trk-mtd Buckeye Mod M20-A-TC, 24 Aug 55

1079 Htr, asph, trlr-mtd, William Bros Mod SG-45T, 22 Oct 55

1177 Roller, road, gas-drvn, 3-axle, Buffalo-Springfield Mod KX-16 C2, 20 Oct 55

1198 Crane-shvl, PU, rev, Buckeye Mod 70, 27 Oct 55

5450 Comp, air, port, 2-stage, Ingeroll-Rand Mod HK-105, 14 Nov 55

9539 Crane-shvl, PU, Schield Bantam Mod M49A, 2 Nov 55

ENG 7, 8 & 9's

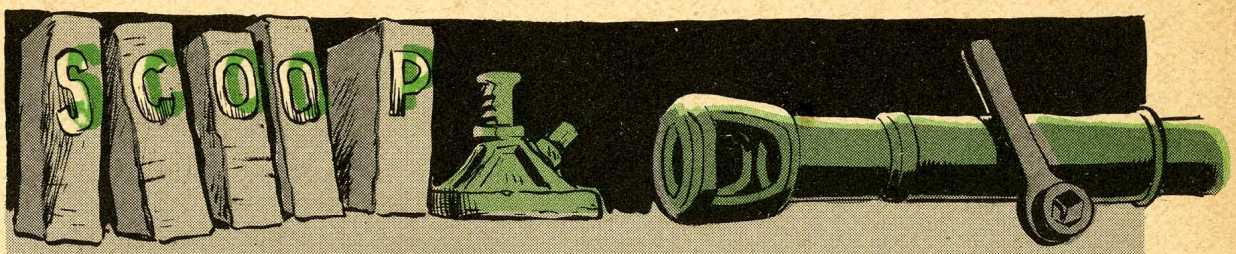
6500-2 Level, Dumpy, Gurley Mod 372 & Level & Gurley Mod 402 tripod, 21 Oct 55

6700-1 Level, Dumpy, w/acc & tripod, Brunson Mod 45, 17 Oct 55

4085 Drill, pneu, port, Worthington Mod WJ-55, 21 Oct 55

6400-3 Transit, w/accessories & American type tripod, White Mod 7012 transit and 9070 tripod, 27 Oct 55

9372-4 PCU, cable-optg, rear-mtg, 2-drum, 12,100 to 17,000 lb drawbar pull for Caterpillar D6 and Le Tourneau R-678; 17,000 to 24,000 lb drawbar pull for Caterpillar D7 and LeTourneau R-7 and 24,100 to 32,000 lb drawbar pull for Caterpillar D8 and LeTourneau R-8.



Here's a list of additional Official Publications on Ordnance Equipment which are of interest to a lot of you.

SUPPLY MANUALS

ORD 5-3-3 List pricing guide—parts and equip for wpns and sighting and FC, Nov 55

ORD 5-3-7, C1 List pricing guide—H-group mat, Nov 55

ORD 5-3-8, C1 List pricing guide—K-group mat, Nov 55

ORD 5-3-9 List pricing guide—L-group mat, Nov 55

ORD 9 SNL A-50, C1 Auto, gun 40-mm, M1, M1A1; Gun, dual, auto, 40-mm M2; Carriage, gun, 40-mm, M2A1, M2A3; Mt, gun 40-mm M3 and mt, gun, twin, 40-mm, M4, Sep 55

ORD 7 SNL B-49 Auto, pistol cal. .22, high stdrd supermatic, Nov 55

ORD 8 SNL D-54 Mt, comb gun, M78, Oct 55

ORD 8 SNL F-295 Mt, M64, M72, Nov 55

ORD 8 SNL F-321, C2 Sight, M19A1, Nov 55

ORD 9 SNL F-342 Vol 4A, C-1 FC system, AAA, T33C, T33D—Vol 4—List of all service parts of console, tracking (7622028), Nov 55

ORD 8 SNL F-353 Mt, M85, Oct 55

ORD 8 SNL F-373 Panoramic, telescope T149E1, Oct 55

ORD 8 SNL F-386, C1 Computer, T31, Dec 55

ORD 7 SNL G-253, C1 Self-prop, gun, full track: twin 40-mm, M42, Oct 55

ORD 9 SNL G-281 Tank recovery veh: med, M74, Sep 55

ORD 7 SNL G-502, C1 ¾ ton truck, T214; Nov 55

ORD 6 SNL J-7 Sec 13, C1 Tool set, org maint, rocket bry (762-mm), Nov 55

ORD 6 SNL J-8 Sec 1, C1 Tool set, fld, expl ord dis squad, Dec 55

ORD 6 SNL J-8 Sec 22, C2 Shop set, fld, sp parts storage, Set 1, Nov 55

ORD 6 SNL J-8 Sec 23, C2 Shop set, fld, sp parts storage, Set 2, Nov 55

ORD 6 SNL J-8 Sec 26, C1 Tool set, fld, chem munitions safety control, No. 1 common, Nov 55

ORD 6 SNL J-8 Sec 30, C2 Tool set, fld, ord park co. (Army/Comz), Dec 55

ORD 6 SNL J-8 Sec 35, C1 Shop set, fld NIKE, Nov 55

ORD 6 SNL J-9 Sec 4, C1 Tool set, rebabbitting, auto bearings, inserts, Nov 55

ORD 6 SNL J-10 Sec 4, C1 Tool set, gen'l mechanic's, Nov 55

ORD 6 SNL J-10 Sec 6, C1 Tool set, welder's, Nov 55

ORD 6 SNL J-10 Sec 8, C2 Tool set, auto fuel, elec sys repair, Dec 55

ORD 6 SNL J-10 Sec 15, C1 Tool set, canvas and leather repair, Dec 55

ORD 6 SNL J-10 Sec 17, C2 Tool set, gen'l mechanic, army aircrft, Nov 55

ORD 6 SNL J-10 Sec 18, C1 Tool set, elec, army aircraft, Nov 55

ORD 6 SNL J-10 Sec 19, C2 Tool set, paint, dope, fab wkr, army aircrft, Nov 55

ORD 6 SNL J-10 Sec 21, C2 Tool set, FC mech, Nov 55

ORD 6 SNL J-15 Sec 3 Spcl tool sets FCS T38 (fld set) used w/AAA, Nov 55

ORD 6 SNL J-16 Sec 67 Tool sets, fld, depot maint for controlled differential used in M59, Nov 55

SM 9-5-1325 Stock list, Ammo, FCS 1325, Sep 55

SM 9-5-1375 Stock list, Ammo, FSC 1375, Nov 55

TECHNICAL MANUALS

TM 9-1580, C1 Binoculars M3, M7, M8, M9, M13, M13A1, M15, M15A1, M16, M17, and M17A1 and BC telescope M65, Nov 55

TM 9-1730A, C1 Continental 6-cyl engine Mod AOS-895-3, Nov 55

TM 9-6069 Boresight M41 (T150), Nov 55

TM 9-6071 Sight M40 (T149E2), Nov 55

TM 9-6083 Remote control system M12A1, Nov 55

TM 9-6166 Aiming Circle M2, Oct 55

TM 9-7009-1, C1 12-cyl air-cool engine Continental, models AV-1790-5A, AV-1790-5B, AV-1790-7, Dec 55

TM 9-8002 10-ton M123 6x6 Truck Tractor, Nov 55

TM 9-8023-3 TO 36A12-1B-332 Body auxiliary equip 2½-ton, M34, M35, M47, M59, M109, Oct 55

TM 9-9036-7 Buffing machine single-ph 60-cy 110-v ¼-horsepower Baldor Electric Type 11-16C-4 (40-G-138), Nov 55

TM 9-9096-1 (TO 34C2-9-3-21) Metal Cutting Shaper (Delta Modl 27-100) (40-S-1570) Nov 55

TM 9-9098-1 Arcwelding machine, 300-amp, gas 3-KW, 115-v aux (Hobart Bros Model GR-300-S) (3375-255-9991) Oct 55

TM 9-9624-5 Clutch adj fixture—7650184 (for FCS T38) Oct 55

ORDNANCE MWO'S

A50-W38 40-mm AAA gun carriages M2A1, M2A3, M27 and radar equip trlr V-62/MPQ-10: Prov batteries to insure opn breakaway system, all temps **F**, Nov 55

D65-W4 Trk-mtd 762-mm rocket Launcher XM289: holders stow leveling jack handles **F**, Nov 55

F238-W2, C1 Binoculars M17 and M17A1: remove, install left prism shelf assy and reticle assy as unit **D** Dec 55

F342-W5 AAA FC systems M33C, M33D, T33C, and T33D: replace resistors in slewing relay circuits **F**, Dec 55

G1-W46, C2 Armored inf veh T59; 2½-ton M135, M211, M215, M217, M220, M221 and M222: Install new transmission control-valve outer body **D**, Nov 55

G1-W62 2½-ton trks M34, M35, M36, M47, M49, M50, M59, M108, M109, M135, M211, M215, M217, M220, M222, V-17A/MTQ, V-18A/MTQ; trk chassis M44, M45, M46; trk trctrs M48, M221, and M275; install improved gasket on winch automatic brake case cover, **F**, Dec 55

G254-W14 90-mm gun, M48 tank: Install new turret blower **O**, Dec 55

G254-W15 90-mm gun M48 Tank: Replace compensating idler arm assemblies **O**, Dec 55

G268-W10 4x4 hvy front gun-lift M249, 4x4 hvy rear gun-lift M250: Replace hydc hoist cyl 1-stage lift shackles w/2-stage shackles **O**, Nov 55

G744-W20 5-ton 6x6 trks, M41, M54, M55; M64; Tr M40, M61, M63, M139, and M139C (M139E1); M51; M62; M52; M246; install lube fitting on front winch drive shaft U-Joint yoke **F**, Dec 55

G744-W27 5-ton 6x6 M62 trk: Install restrictor in power divider governor valve control, valve-to-power divider governor valve vacuum line **F**, Dec 55

G754-W8 1½-ton trlr M104: Prevent distortion, spreading of cargo rack stakes **F**, Dec 55

G768-W3, C1 2½-ton 4x2 dump trk (GMC models HC-451, HC-452): Bolting dump body sub-frame and chassis frame togetner **F**, Dec 55

SUPPLY BULLETINS

SB 9-86 Comm'l type vehicles: Procurement, installation signal lights **D**, Nov 55

TECHNICAL BULLETINS

TB 9-0SSC-G Storage and shipment chart, group G All Nov 55

TB 9-7009-6/3 Cross-drive transmission Models CD-850-4, -4A: Adaptation of -4A housing to -4 transmission **D**, Dec 55

TB 9-7205-2/3 Elev and trav system components for self-prop 155-mm gun T97 and 8-in how T108 **D**, Oct 55

TB 9-8006-2 Front 4x4 hvy gun-lift M249 and rear 4x4 hvy gun-lifting trk M250: Inspect flex hyd hose **O**, Nov 55

TB 9-8028-1 (TO 36A12-1C-311) 5-ton 6x6 trk M62 and trk trctr-wrckr M246: Marking crane boom **O**, Dec 55

TB ORD 597-32 (TO 34C2-5-8-22) Milling Mach (Van Norman Co, models 12 and 12 mod) (40-M-39): Rebld stndrds **D**, Nov 55

TB ORD 597-33 Lathe attachment (Master Mfg Co, model C) (3430-449-6655): Rebuild stndrds **D**, Nov 55

TB ORD 618 Shell, HE, M48 w/pd fuze for 75-mm how and shell, WP, M64 w/pd fuze for 75-mm how: Caln data for certain lots Oct 55

TB Ord 622 Continental model AOS-895, AV-1790 series engines: Proper connecting rods, pistons **F**, and **D**, Dec 55

LUBRICATION ORDERS

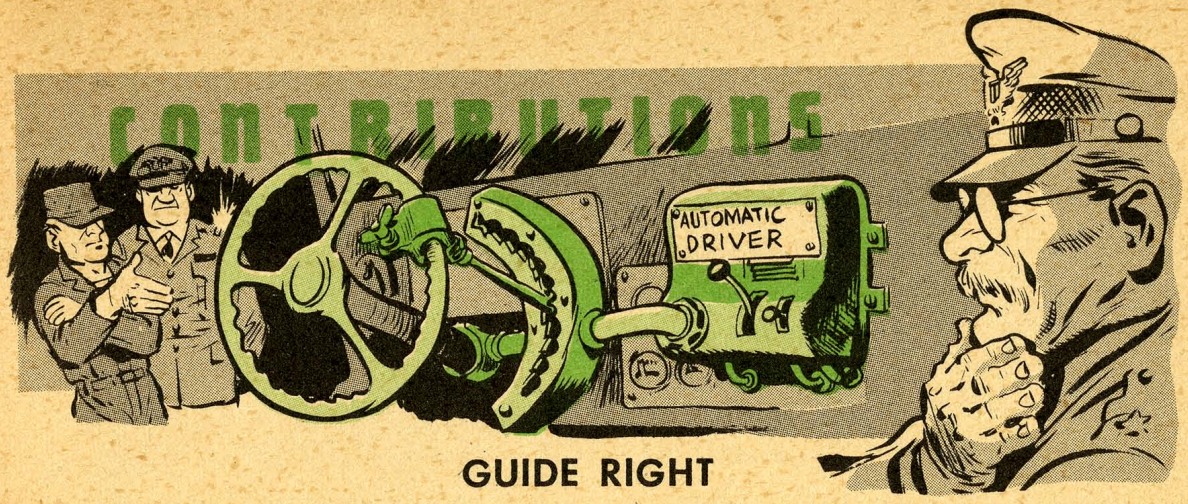
LO 9-U700 Buffing machine, tire (Retreading Equip Co. US 15-A) Sep 55

LO 9-3026-1 75-mm, T83E6 or T83E7 on gun, 75-mm T69 gun, AA, Recoil mechanism, T47E2 or T47E3, loader rammer, T23 Nov 55

LO 9-8022 2½-ton truck, 6x6 M34, M35, M44, M46, M47, M48, M49, M50, M59, M108, M109, M275, V17A/MTQ, V18A/MTQ Nov 55

LO 9-9092-2 Sawing Machine, ½ hp, 110-v, 60 c, (Armstrong-Blum Mfg. Co. Model Mar No. 2) Sep 55

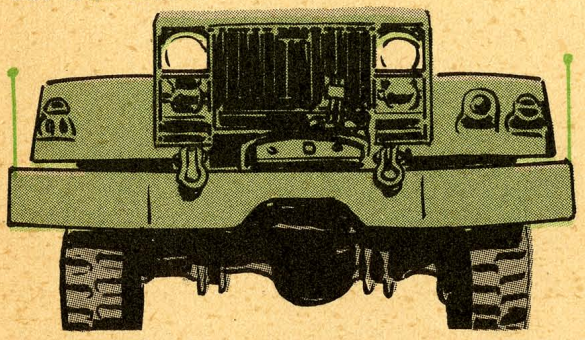
NOTE—On TB's, SB's and MWO's:
O—Organizational Maintenance
F—Field Maintenance
D—Depot Maintenance



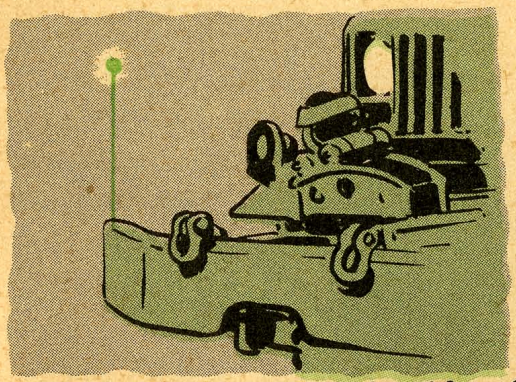
GUIDE RIGHT

Dear Editor,

How about putting a guide pole on both sides of the M62's front bumper for our trainee drivers?



This'd help the green drivers learn the difference between those monstrous wreckers and their tiny civilian cars.



Especially on the right side—they can't see the fender. A guide would tell them how close they are to eternity when they make a hairpin curve on those narrow mountain roads. Or keep them from smacking into other vehicles. After they've got the feel and know-how to judge the distance, these guides can be removed.

They're easily made—here's all you've got to do: Drill a ½-in hole about an inch from each end of the bumper. Get a piece of ½-in stock rod, 2 feet long, thread one end and insert it about an inch into the hole. Secure it on the bottom with a nut. Any piece of round scrap metal can be soldered or welded to the top of the rod to serve as a guide spot.

You can paint the rod OD color and the tip white.

SFC F. H.
New Hampshire National Guard

(Ed Note—Good deal if it'll make better drivers and keep trucks from getting beat up. But first get your Old Man's OK. Section 2e of AR 385-10, Mar 53, says "Each commander at every echelon is responsible for incorporating adequate safe practice and provision for safe physical standards in all operations..." So I'm sure you'll get his blessings. Also why not tack-weld the rod on the edge of the bumper—this'll leave no tell-tale holes when you remove the guide rod, since this is just for training situations.)

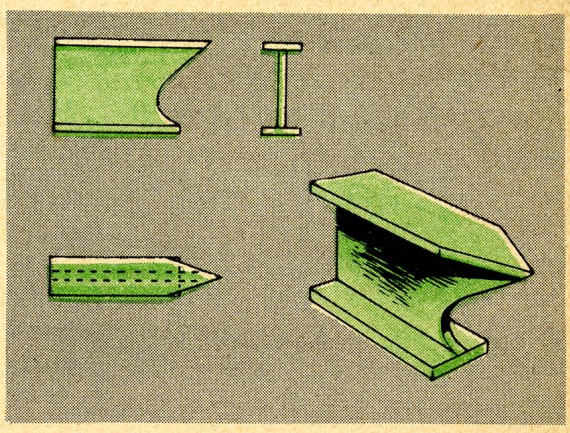
SMITTY'S HELPER

Dear Editor,

Here's a sketch of an anvil we are using in our motor pool. It's made out of a chunk of scrap "I" beam. Ours happens to be a 4x8-in I-beam, but any you find handy will do. We pointed it with our cutting torch and cut it to convenient length, in this case about 18 inches.

I reckon lots of the boys might find this handy in their own shops.

Sgt Earl D. Barnard
Ft Lewis, Washington



(Ed Note—Your anvil looks like a fine idea. We've also seen these made in much the same way out of a short length of railroad iron.)

JEEP'S CLUTCH-ROD

Dear Editor,

After getting tired of replacing broken Jeep clutch-release-rods (Ord Stock No. G740-7372826) about every three months, our motor pool came up with this idea. It's over five months since we put the first ones on, and haven't broken any yet.

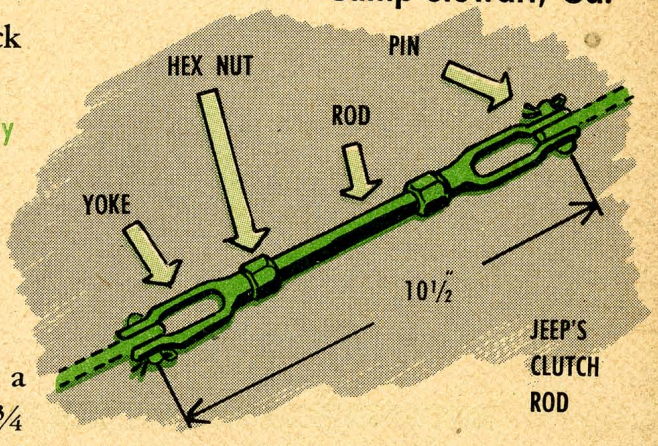
To make one, use these Ord stock parts:

1 G740-7372826—Rod, pedal, release (or any 5/16-in rod)
2 G503-7371363—Yoke
1 H001-4167561—Nut, hex
2 H001-05-44190—Pin, clevis
2 cotter pins, size 5/64 x 1/2 inches

Cut the rod to 6½ inches and put a 24 NF thread on approximately 1¾ inches up one end. And on the other end weld a yoke. Then screw the second yoke to the threaded portion of the rod. And you're set.

Besides not breaking, they're great for clutch pedal adjustment. It not only saves time, but it allows greater ranges in making adjustments and won't interfere with the clutch-release-fork.

M/Sgt J. J. Durrence
Camp Stewart, Ga.



(Ed Note—Swell idea. A lot of other men have sent in fixes similar to yours. The MWO will tell you about this. This should stop those rods from breaking.)

Connie Rodd's BRIEFS

Trailer connections

Seems like everyone would know better, but plenty trailer electrical connectors are being busted by somebody pulling them **up** instead of **out** when uncoupling. So, please—let's remember that we want to break connection **not** the connector—pull 'em straight out easy like.

Free throttle

On the 120-mm AAA gun, keep your recoil-throttling-valve-guide free of paint and well oiled. If it sticks **in** it results in abnormally short recoil at low elevation and a great strain on the carriage. So take a quick look at TM 9-380 and LO 9-380, and then check your weapon.

3/4-ton supply manual

That latest Ord 7 SNL G-741 (Sept 55) for your ¾-ton trucks is now available, remember. It's the kind of publication you'll want to look over and become familiar with. So, why not hop down to the supply room and take a gander at it.

Time for a change

Are you having trouble hooking your 60-cycle 30-KW generator to your FCS T38 shop truck (XM284)? If so, you probably have one of those few that were issued with 4-prong connectors. Since the van's power cables are for 3-prong connectors, ask your supply sarge for Receptacle Assembly, 3-pole, 5935-5578536, MACF207. With this 3-pole receptacle mounted in your truck your cable will work OK.

New M74 Ord 7

For you guys who are interested in the M74 tank recovery vehicle, that new Ord 7 SNL G-281 (20 Sept 55) is available. Just check with your supply sarge and he'll give you the lowdown on it.

Dial "B" for blooey!

Good way to keep from growing old is to be careless around a tank—like gassing up and using your radio at the same time. When y'flip the transmitter on, there's almost sure to be a spark. Put fumes and spark together, and what do y'get? WHOOSH—BAM—BLOOEY!

HANDLE 'EM

LIKE EGGS . . .

THAT'S THE WAY TO HANDLE THOSE PARTS THAT DON'T WORK

WHEN YOU TAKE THEM OFF YOUR ARMY EQUIPMENT, GIVE 'EM YOUR BEST GENTLE CARE SO THEY CAN BE REPAIRED, USED AGAIN.

NEVER KICK A PART WHEN IT'S DOWN

GIVE IT AN E-A-S-Y LIFT

TO YOUR ORDNANCE OR ENGINEER SUPPORT UNIT